Ambient Air Quality Monitoring
Opportunity and Warm Springs Sites
Second Quarter of 2010

Prepared for

Anaconda Deer Lodge County

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APPENDICES

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1.0 INTRODUCTION

This quarterly report documents the ambient air quality monitoring program conducted by Kuipers & Associates on behalf of Anaconda Deer Lodge County (ADLC) at Opportunity and Warm Springs locations adjacent to the Atlantic Richfield Lower Waste Management Area (LWMA). The months of April through June 2010 are included in this quarterly report, with a more detailed data summary in the monthly reports.

Objectives of this quarterly report include the following:

- Summarize the PM10 and Total Suspended Particulate (TSP) data on a quarterly basis and compare to applicable standards.
- Compare daily average TSP values recorded by the Opportunity Site against the PM10 values reported by the Atlantic Richfield Company's South Site.
- Present summarized meteorological data for the quarter.
- Present summarized results for ambient dust sampling conducted during the quarter.
- Present the Data Quality Summary (PM10, TSP and meteorological).
    - Review the hourly data according to the Environmental Protection Agency's Air Quality System Null Data Qualifier Codes.
    - Format hourly PM10 and TSP data for each month to fit the Environmental Protection Agency's Air Quality System raw data template.

Figure 1 shows the ADLC monitoring locations in Opportunity and Warm Springs, and the Atlantic Richfield Company’s South Site monitoring location.


ADLC Warm Springs PM10
ARCO North PM10
ADLC Opportunity TSP
ARCO South PM10
Feet
0 625 1,250 2,500 3,750 5,000
N
Water & Environmental Technologies
Anaconda Deer Lodge County
Air Quality Monitoring points
Figure 1

2.0 PM10 AND TSP DATA SUMMARY

The Met One E-BAM portable PM10 monitor at Warm Springs and the TSP monitor at Opportunity collected continuous hourly data from April 1 through June 30.

During the period of operation, data recovery was 99.7% at Opportunity and 99.6% at Warm Springs. Detailed ambient air quality monitoring results for the second quarter of 2010 are summarized in the April, May and June monthly reports prepared by Kuipers & Associates. A general discussion of ambient air quality monitoring data from the second quarter of 2010 is provided in the following sections. All PM10 and TSP data are reported at Local temperature and pressure (LTP) conditions.

2.1 Opportunity Site

At the Opportunity location daily average TSP concentrations ranged from non-detectable to 60 $\mu g/m^3$ with an average of 13 $\mu g/m^3$ throughout the second quarter. The maximum daily average TSP reading of 60 $\mu g/m^3$ was observed on June 29. Moderate southerly winds occurred with the highest concentrations on that day, indicating that LWMA activities were probably not a contributing source. Sampling was not conducted by the adjacent ARCO South PM10 monitor on that day, so no comparison could be made between it and the ADLC E-BAM sampler. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 49 $\mu g/m^3$ in April, 60 $\mu g/m^3$ in May and 43 $\mu g/m^3$ in June. Daily average TSP concentrations for the quarter are presented in Figure 2 for the Opportunity monitoring site, and also in Appendix A.

Currently, there is no ambient air quality standard for TSP. However, all daily average TSP results for the second quarter of 2010 at Opportunity were well below the historical 24-hour Montana Ambient Air Quality Standard of 200 $\mu g/m^3$.

No Opportunity TSP data from the second quarter was rejected or omitted for quality assurance or quality control check results. Only minor data losses occurred, mostly due to routine maintenance activities.

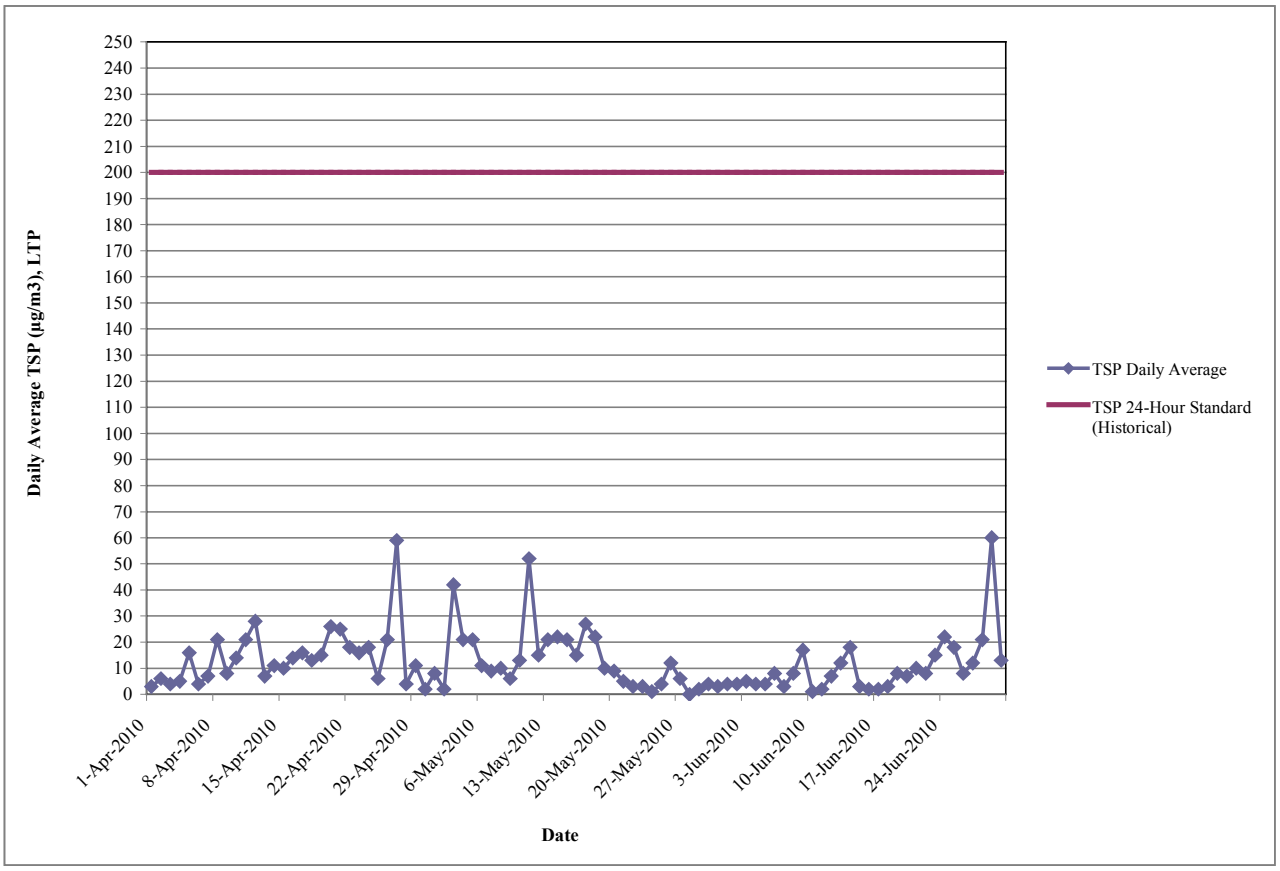

FIGURE 2– OPPORTUNITY SITE DAILY AVERAGE TSP CONCENTRATION

2.2 Warm Springs Site

At the Warm Springs location daily average PM10 concentrations ranged from non-detectable to 20 µg/m^3 with a quarterly average of 5 µg/m^3. The maximum daily average PM10 reading of 20 µg/m^3 was observed on June 29. Strong southerly winds occurred during the highest readings on that day. Because the highest PM10 readings at Warm Springs coincided with the highest TSP readings at Opportunity, it is suspected that they were associated with a regional dust event, rather than LWMA activities. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 21 µg/m^3 in April, 24 µg/m^3 in May and 31 µg/m^3 in June. Daily PM10 average concentrations for the second quarter are presented in Figure 3 for the Warm Springs monitoring site, and also in Appendix A.

All daily average PM10 results for the second quarter of 2010 at Warm Springs were well below the 24-hour Montana Ambient Air Quality Standard of 150 µg/m^3. No Warm Springs PM10 data from the second quarter was rejected or omitted for quality assurance or quality control reasons. Only minor data losses occurred, mostly due to routine maintenance and repair activities.

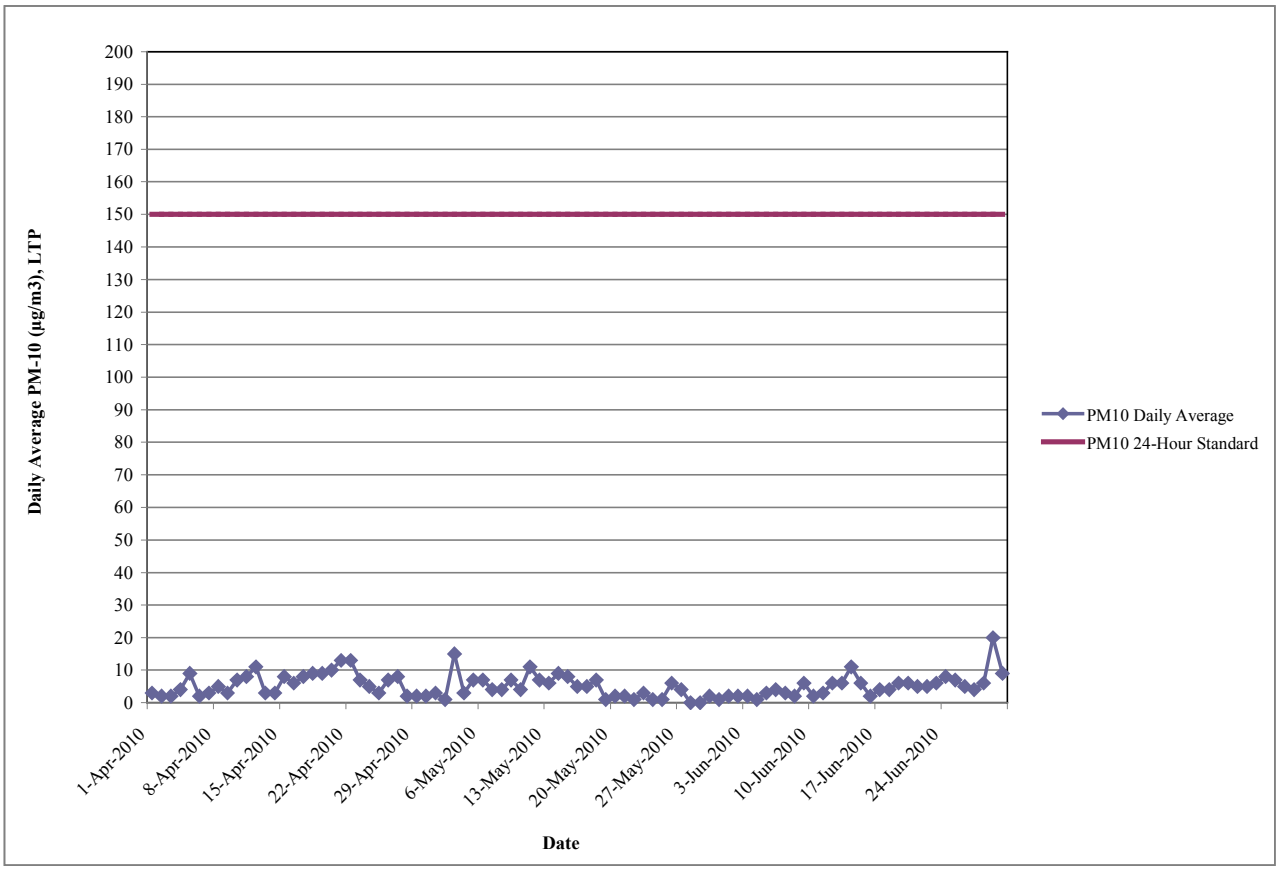

FIGURE 3 - WARM SPRINGS SITE DAILY AVERAGE PM10 CONCENTRATION

3.0 COLLOCATED PARTICULATE MONITORING RESULTS COMPARISON

Daily average (24-hour) results from the ADLC E-BAM TSP monitor at the Opportunity site were compared to the Atlantic Richfield Wedding PM10 monitors at the South Site for the quarter. The ADLC monitor collects screening level data, while the Atlantic Richfield monitors follow a federal reference method (FRM) required for compliance with air quality standards. While these are different measurements, collocated PM10 data collected at Opportunity from May 2007 through June 2008 indicated good general agreement between the E-BAM and Wedding PM10 monitoring systems. Therefore, a comparison of the E-BAM TSP data versus Wedding PM10 data should provide an indication of the ratio of total airborne particulate to the inhalable fraction (PM10).

The individual collocated results are listed in Table 1, and depicted graphically in Figure 4. While the ratio shows high day-to-day variability –particularly at lower concentrations – on average the total amount of airborne particulate (TSP) was over twice the amount of inhalable particulate (PM10). The average of the daily TSP/PM10 ratios was 2.38 to 1, while the total mass ratio was 2.35 to 1. This is consistent with the ratios observed during previous quarters, which were usually between 2:1 and 3:1. The diagonal line on Figure 4 represents a best-fit linear regression of TSP against daily average PM10 values.

TABLE 1 – COLLOCATED RESULTS FOR TSP VS. PM10
DAILY AVERAGE VALUES
SECOND QUARTER 2010
(All values are $\mu g/m^3$ at Local temperature and pressure (LTP))

Date	Standard ARCO - PM-10 Wedding FRM South Site	Test ADLC - TSP Met One E-BAM Opportunity Site	TSP as Percent of PM-10	TSP as Percent of PM-10 Cumulative
April 2, 2010	5	6	120	120
April 5, 2010	8	16	200	169
April 8, 2010	5	21	420	239
April 29, 2010	1	11	1100	284
May 2, 2010	2	2	100	267
May 5, 2010	5	21	420	296
May 8, 2010	5	10	200	281
May 11, 2010	9	52	578	348
May 14, 2010	10	22	220	322
May 17, 2010	10	27	270	313
May 20, 2010	3	9	300	313
May 23, 2010	3	3	100	303
May 26, 2010	7	12	171	290
May 29, 2010	2	2	100	285
June 1, 2010	3	4	133	279
June 4, 2010	5	4	80	267
June 7, 2010	4	3	75	259
June 10, 2010	3	1	33	251
June 13, 2010	6	12	200	248
June 16, 2010	3	2	67	242
June 22, 2010	5	8	160	238
June 25, 2010	8	18	225	238
June 28, 2010	10	21	210	**235**

Mean	238
Maximum	1100
Minimum	33

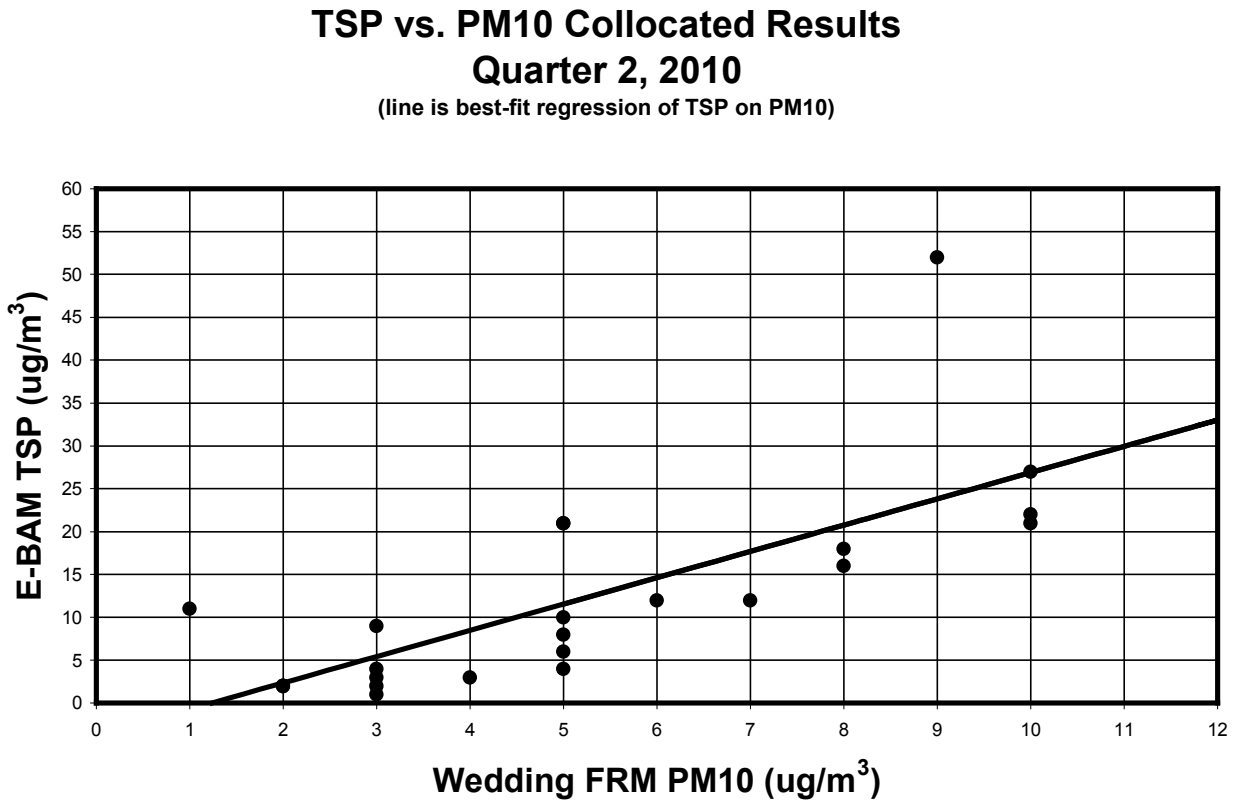

FIGURE 4 – COLLOCATED RESULTS COMPARISON FOR ADLC OPPORTUNITY E-BAM (TSP) AND ATLANTIC RICHFIELD WEDDING FRM (PM10)

4.0 DUST MONITORING RESULTS

Starting August 15, 2008, clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was either dumped or allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes and submitted for analysis. The samples were analyzed for arsenic, cadmium, copper, lead and zinc, as well as total dust weight.

Settled dust samples were collected at both sites during the second quarter of 2010. Results are summarized in Table 2. A memorandum discussing the collection and analysis of the dust samples is presented in Appendix B, including any data quality concerns. The laboratory analytical report is presented in Attachment 1.

Additional sampling using dustfall jars was implemented in October 2008, and samples were collected during the second quarter of 2010. Those results also are summarized in Table 2.

Selected exposed filters from the ARCO South samplers at Opportunity are analyzed for arsenic and lead concentrations, in addition to PM10. Average concentrations of arsenic and lead for the ARCO samples were calculated for the first two quarters of calendar year 2010 on a total mass basis, using the four days with PM10 concentrations of 10 $\mu g/m^3$ or more. Recognizing the very small sample size, a result of 44 mg/kg was obtained for arsenic and 152 mg/kg for lead. Although the sampling methods are much different, and the ARCO samplers collect only PM10 (rather than total particulate), the arsenic and lead concentrations shown in Table 2 are of the same order of magnitude as those calculated for the ARCO air samples – somewhat higher for arsenic, and lower for lead.

In general the arsenic and lead concentrations at Opportunity were consistent between the dustfall and settled dust samples. However, at Warm Springs it was noted that trace element concentrations in general were higher in the dustfall jar samples versus the settled dust collection dishes. Differences in concentrations from dustfall jar samples versus settled dish samples could reflect that portions of the dish dust are blown out by wind between site visits, while most dust collected by the much deeper dustfall jars is retained.

TABLE 2 – SUMMARY OF DUST MONITORING RESULTS

Samples collected March 28 – April 26, 2010					
Analyte (mg/kg)	**Opportunity**			**Warm Springs**	
	Settled Dust	**Dustfall-A**	**Dustfall-B**	**Settled Dust**	**Dustfall**
As	51.1	64.6	65.9	31.3	81.8
Cd	2.08	2.20	6.25	1.63	2.65
Cu	371	275	344	170	492
Pb	69.8	76.1	67.3	73.4	170
Zn	374	628	1063	301	850
Dustfall Rate (g/m^2/month) (1)	N/A	0.69	0.83	N/A	0.44
(1) Based on a 30-day month					

5.0 METEOROLOGICAL DATA SUMMARY

Meteorological data were collected continuously and recorded hourly at both the Opportunity and Warm Springs E-BAM monitoring sites. Parameters monitored include wind direction, wind speed, temperature, and relative humidity. The Opportunity site also monitors precipitation. The data were collected at a height of approximately eight feet above ground level.

Summarized meteorological data for these sites are presented and discussed in Sections 5.1 and 5.2. Detailed daily meteorological summaries are presented in Appendix A. Information presented includes:

- Average, maximum and minimum air (shade) temperature for each day,
- Average and maximum hourly average wind speed for each day,
- Resultant wind direction for each day (weighted by wind speed – this is the mean direction from which the wind was blowing),
- Average daily relative humidity, and
- Total daily precipitation (Opportunity).

Additionally, the summaries in Appendix A show the average daily and maximum daily PM10 and TSP concentrations, to facilitate correlation with the meteorological data.
Section 5.3 presents wind rose summaries for periods with elevated PM10 and TSP concentrations.

5.1 Opportunity Site

Figure 5 summarizes the meteorological data for the Opportunity site. Winds were generally light, averaging 2.4 m/s (5.4 mph). The highest recorded hourly wind speed was 10.2 m/s (22.8 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were below normal in April and May, and near normal in June. Monthly averages were 4.1°C (39.4°F) in April, 6.3°C (43.3°F) in May and 12.0°C (53.6°F) in June. Temperature extremes ranged from a low of –10.7°C (12.7°F) in both April and May, to a high of 29.6°C (85.3°F) in June. The average humidity for the quarter was 58%, with considerable daily variation.

Winds at the Opportunity site were mostly from the southwest quadrant, and from the north and north-northeast. The strongest winds tended to be from the north, and from the southwest.

Total precipitation at Opportunity was 0.34 inches in April, 1.98 inches in May and 3.35 inches in June. The late part of the quarter was much wetter than normal.

Minor meteorological data losses occurred due to routine maintenance, but none occurred due to data quality issues. However, 122 hours of wind direction data (but not wind speed) were invalidated during April because the wind direction unit's vane portion came off when a set screw worked loose. A brief period of wind data also was invalidated because of suspected icing conditions.

Part 1 – Means and Extremes

Parameter	April	May	June	Quarter
Average Wind Speed, m/s	2.6	2.5	2.0	2.4
Maximum (hourly) Wind Speed, m/s	7.8	10.2	6.2	10.2
Average Temperature, °C	4.1	6.3	12.0	7.5
Maximum Temperature, °C	22.9	23.6	29.6	29.6
Minimum Temperature, °C	-10.7	-10.7	-0.8	-10.7
Total Precipitation, inches	0.34	1.98	3.35	5.67
Average Relative Humidity, %	54	58	61	58
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 2, 2010 Wind Rose

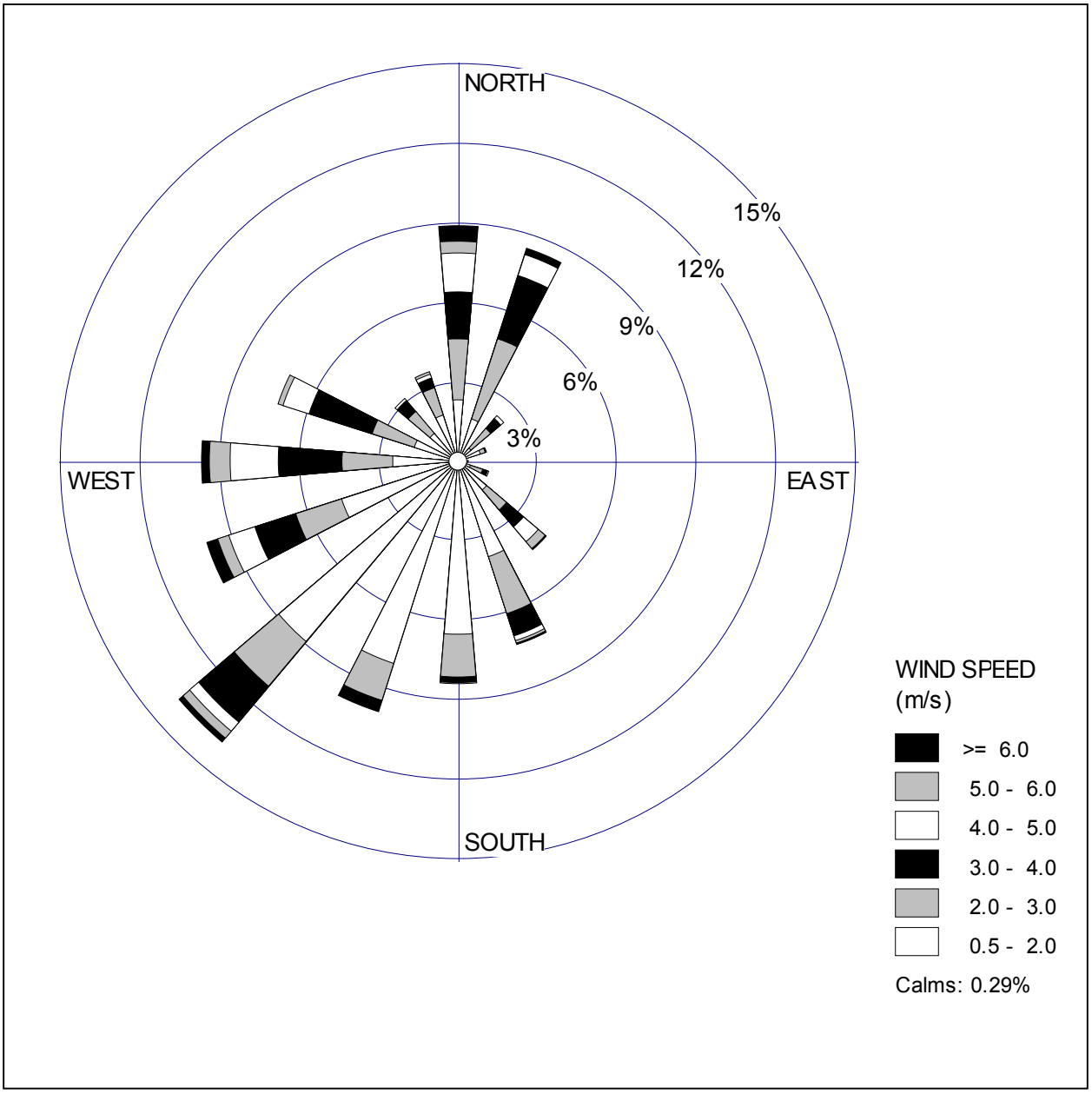

FIGURE 5 – METEOROLOGICAL SUMMARY FOR OPPORTUNITY SITE

5.2 Warm Springs Site

Figure 6 summarizes the meteorological data for the Warm Springs site. Winds were generally light, averaging 2.1 m/s (4.7 mph). The highest recorded hourly wind speed was 10.5 m/s (23.5 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were below normal in April and May, and near normal in June. Monthly averages were 4.7°C (40.5°F) in April, 7.1°C (44.8°F) in May and 12.8°C (55.0°F) in June. Temperature extremes ranged from a low of –10.8°C (12.6°F) in April to a high of 29.7°C (85.5°F) in June. The average humidity for the quarter was 59%, with considerable daily variation.

Winds at the Warm Springs site were mostly from southerly and northerly directions, although some west winds occurred. South-southwesterly winds tended to be the strongest.

Minor meteorological data losses occurred due to routine maintenance, but none occurred due to data quality issues. A brief wind data period was invalidated due to suspected icing conditions.

Part 1 – Means and Extremes

Parameter	April	May	June	Quarter
Average Wind Speed, m/s	2.2	2.2	1.9	2.1
Maximum (hourly) Wind Speed, m/s	7.3	10.5	6.9	10.5
Average Temperature, °C	4.7	7.1	12.8	8.2
Maximum Temperature, °C	23.8	24.6	29.7	29.7
Minimum Temperature, °C	-10.8	-9.9	0.1	-10.8
Average Relative Humidity, %	55	59	64	59
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 2, 2010 Wind Rose

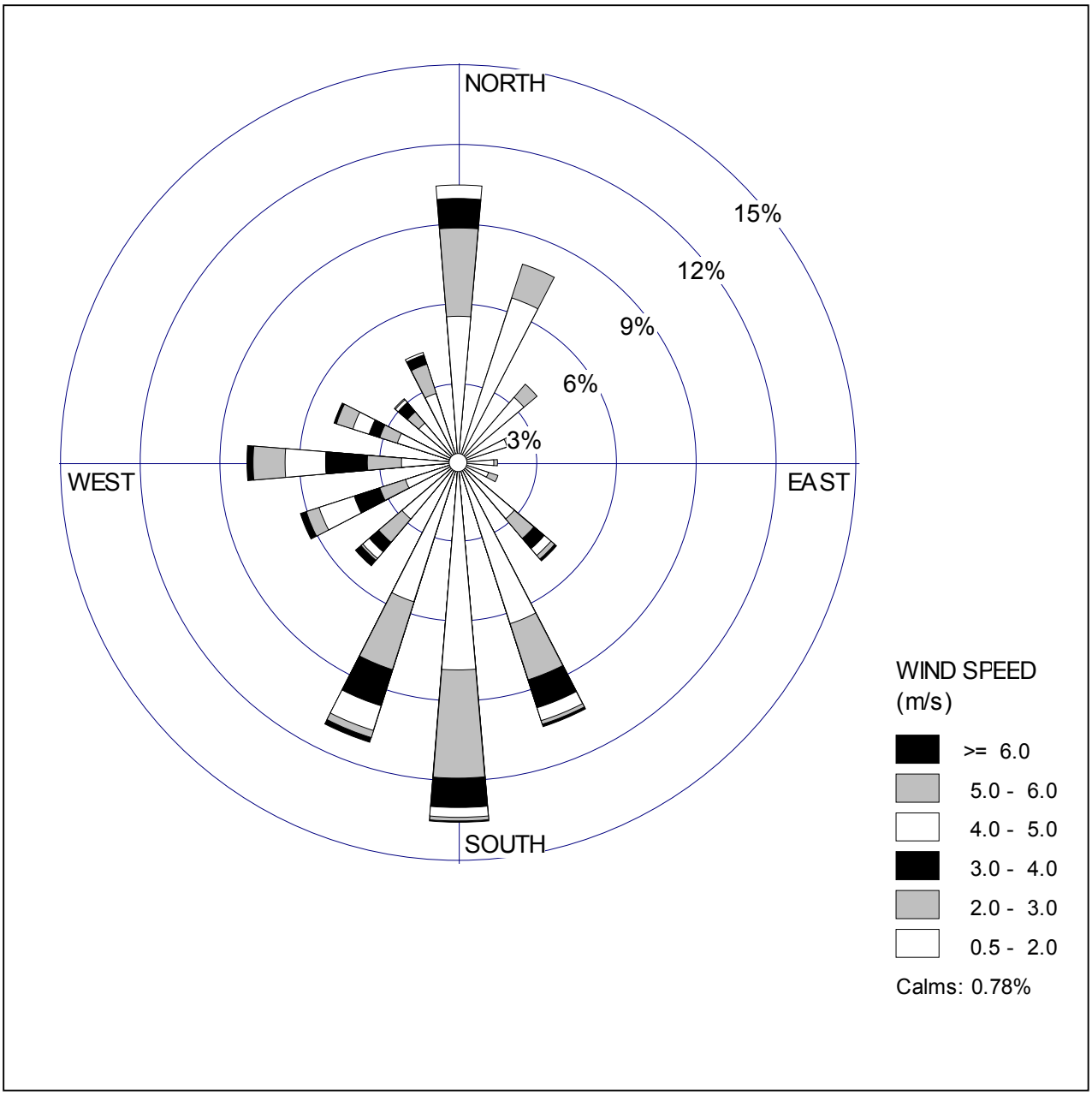

FIGURE 6 – METEOROLOGICAL SUMMARY FOR WARM SPRINGS SITE

5.3 Meteorological Conditions and Particulate Concentrations

Additional wind roses were generated for both monitoring sites to depict wind patterns during periods of elevated particulate concentrations – with the Opportunity site shown in Figure 7 and the Warm Springs site shown in Figure 8. For this analysis, "elevated" was defined as TSP concentrations greater than 40 $\mu g/m^3$ at Opportunity, and PM10 concentrations of greater than or equal to 20 $\mu g/m^3$ at Warm Springs. These thresholds – corresponding to roughly the 95^{th} percentile at both sites– were used to ensure that a sufficient volume of data was incorporated to produce meaningful wind rose results.

When comparing the wind roses for the Opportunity site (Figures 5 and 7), it is evident that wind speeds were generally higher during elevated TSP conditions. This is reasonable, since the larger – and therefore heavier – particulates collected by a TSP monitor would require greater wind activity to be entrained into the air. The wind direction distribution during elevated TSP periods was not greatly different from the overall pattern. Overall, this indicates that elevated TSP concentrations were mostly related to wind speed, rather than impacts from the LWMA.

The corresponding wind roses for the Warm Springs site (Figures 6 and 8) show that wind directions during elevated PM10 periods were similar to the overall pattern. The wind speed pattern is interesting, as both very strong ***and*** very light winds were common. It is suspected that very light winds may cause elevated PM10 conditions because of air stagnation, while very strong winds have a similar effect due to entrainment of surface dust. The wind roses for Warm Springs don't suggest a strong association with LWMA activities.

These comparisons indicate that overall ambient particulate conditions at both sites were not significantly affected by LWMA activities during the second quarter.

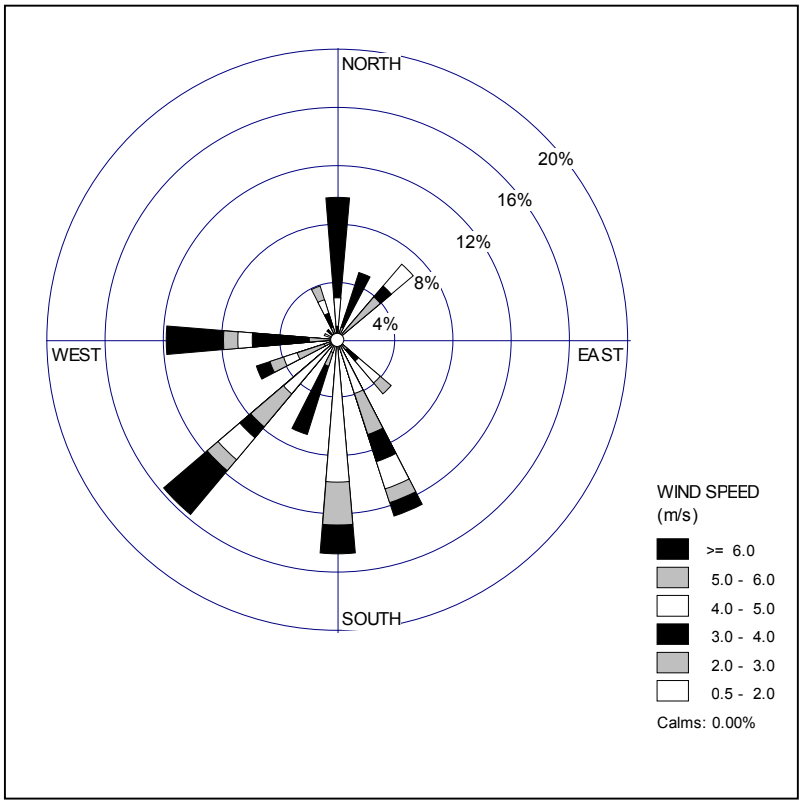

FIGURE 7 – OPPORTUNITY WIND ROSE FOR ELEVATED TSP PERIODS

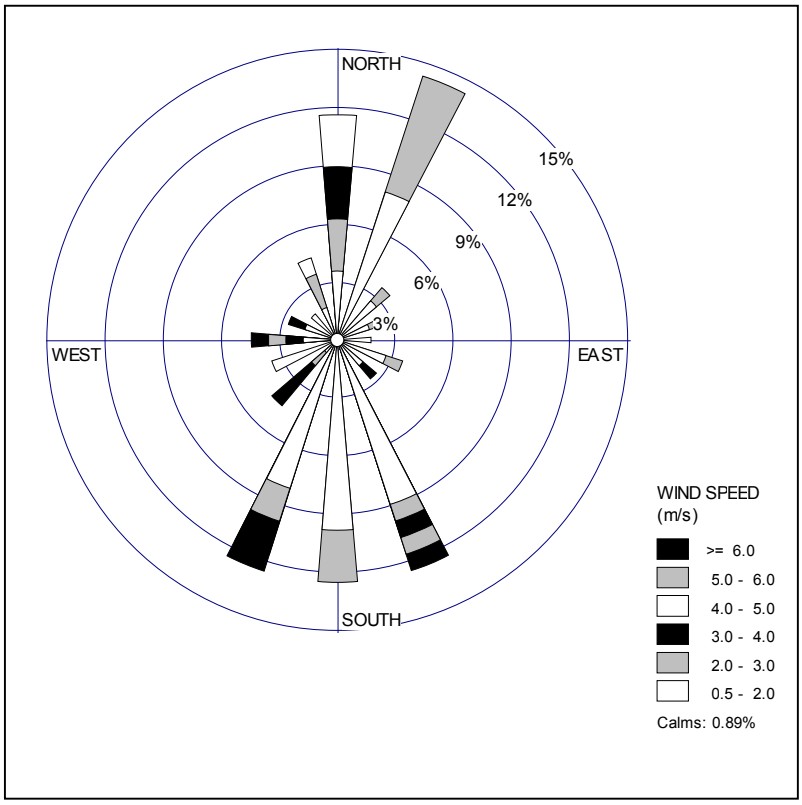

FIGURE 8 – WARM SPRINGS WIND ROSE FOR ELEVATED PM10 PERIODS

6.0 DATA QUALITY SUMMARY

Data quality is an integral part of any ambient monitoring program. The data collected must be of a known quality to be used for evaluation of local air quality and meteorological characteristics. This is particularly important when an objective of a monitoring program is to identify possible emission sources, and meteorological events associated with certain ambient air quality conditions – in this case, elevated PM10 or TSP levels.

The Opportunity and Warm Springs monitoring systems were checked and/or calibrated (as appropriate for each monitoring parameter) monthly during the second quarter of 2010. This was accomplished via performance checks using standards that were either:

- Traceable to NIST; or
- Otherwise certified by the test equipment manufacturer.

Each instrument response was recorded, and evaluated to determine whether it fell within its respective acceptance range. In the event that a response fell outside (or near the limits of) the applicable acceptance range, the monitor or sensor in question was adjusted or recalibrated as appropriate. Such results then must be evaluated, in conjunction with a detailed data review, to identify data periods that must be flagged or invalidated.

Minor sampler maintenance was also performed on a monthly basis. Additionally, data were reviewed frequently via satellite link, and inspected for any suspicious behavior requiring investigation.

6.1 Summary of Performance Check / Maintenance Activities

Performance checks and minor maintenance were conducted on a monthly basis. Table 3 summarizes checks and maintenance for the E-BAM sampler itself, while Table 4 lists the meteorological checks. Information presented includes:

- The instrument model and serial number for each component of the monitoring system;
- Each type of check/maintenance performed on that component;
- Performance acceptance ranges; and
- A description of the calibration standard (and its traceability) used to perform each check.

6.2 Data Quality Issues

In general, performance checks and maintenance activities conducted throughout the second quarter of 2010 indicated that the E-BAM samplers were meeting performance objectives. The performance check procedures and routine maintenance activities are discussed in detail in Appendix C. Results for the second quarter of 2010 are presented in Appendix D. All E-BAM sampler test results obtained during the second quarter of 2010 were satisfactory.

Causes of data losses during the second quarter included the following:

- One hour of EBAM data was lost at each site during the quarter because the units failed to record data.
- One hour of particulate data was invalidated at each site because of suspicion that the readings were affected by a snow event.
- 9 hours of wind data at Opportunity, and 7 hours at Warm Springs were invalidated because of suspected icing conditions.
- At Opportunity 122 hours of wind direction data were lost in April because the vane came off the unit when a set screw worked loose.
- Minor data losses occurred at both sites due to routine maintenance activities.

TABLE 3 – SUMMARY OF PERFORMANCE CHECKS
E-BAM SAMPLER

Met One E-BAM PM_{10} and TSP Samplers

Instrument	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Particulate Sampler	E-BAM	F7290 (TSP)	F7289 (PM_{10})	Leak Check	<1.5 LPM	BX-302 valve	N/A
				Operating Flow	+/- 2% (+/- 0.33 LPM)	Delta Cal S/N 000498	MFR/NIST
				Pump Test	(1)	BX-302 valve	N/A
				Zero/Span	Pass / Fail	Membrane Plates	MFR
				Clean Vane & Nozzle	(2)	N/A	N/A
				Clean PM10 Head	N/A	N/A	N/A
Barometer (3)	E-BAM	F7290	F7289	Collocated	+/- 2 mmHg	Aneroid Barometer	Mercury Barometer

Explanatory Notes for Table 3

N/A = Not applicable
MFR/NIST = Certified traceable to NIST by the manufacturer
MFR = Certified accurate per Met One's E-BAM-6100 Final Test Procedure
(1) Acceptance range varies with test flow rate, see Appendix C for discussion.
(2) Leak check performed following cleaning, result must be <1.5 LPM.
(3) Barometer is internal to E-BAM sampler.

TABLE 4 – SUMMARY OF PERFORMANCE CHECKS METEOROLOGICAL INSTRUMENTS

Met One Meteorological Instruments

Instrument (1)	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Temperature	9250	F9487	F9481	Collocated	+/- 0.5 °C	Assmann Psychrometer	NIST
Relative Humidity	593	F9346	F9349	Collocated	+/- 5% Relative Humidity	Assmann Psychrometer	NIST
Wind Speed	0348	G2181	G2187	Collocated	+/- 0.5 m/s	Met One 010 Sensor	NIST
				Rotation Check	+/- 0.2 m/s	Synchronous Motor	MFR
Wind Direction	0348	G2181	G2187	Initial Alignment	+/- 2 degrees	Solar Sighting	NIST Time
				Linearity	+/- 3 degrees	Visual Crossarm Alignment (2)	N/A

Explanatory Notes for Table 4

(1) All meteorological instruments include certificate of NIST traceability from Met One, valid for a period of one year.
(2) Linearity checked by visually aligning wind vane in 90-degree increments with respect to crossarm.

MFR = Motor rotation rate provided by manufacturer.

7.0 AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES

Invalid hours for the quarter are summarized in Table 5 for the Opportunity site, and Table 6 for the Warm Springs site. The complete PM10 and TSP data sets for the quarter, and current qualifier codes are presented in Appendix E.

TABLE 5 – OPPORTUNITY SITE INVALID DATA PERIODS (QUARTER 2, 2010)

Part A – TSP

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-21-2010	1300-1400	2000-2100	Monthly checks	BA
5-23-2010	0600	1300	Suspect snow effects	AM
5-26-2010	1400	2100	Monthly checks	BA
5-31-2010	0900	1600	Data not recorded	AN
6-18-2010	1700		Monthly checks	BA
6-19-2010		0000	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-21-2010	1400	2100	Monthly checks	BA
4-21-2010	1500-2300	2200-2300	Vane tail came off	AM (1)
4-22-2010	0000-2300	0000-2300	Vane tail came off	AM (1)
4-23-2010	0000-2300	0000-2300	Vane tail came off	AM (1)
4-24-2010	0000-2300	0000-2300	Vane tail came off	AM (1)
4-25-2010	0000-2300	0000-2300	Vane tail came off	AM (1)
4-26-2010	0000-1600	0000-2300	Vane tail came off	AM (1)
5-23-2010	0000-0800	0700-1500	Instrument icing	AO
5-26-2010	1500	2200	Monthly checks	BA
5-31-2010	0900	1600	Data not recorded	AN
6-18-2010	1700		Monthly checks	BA
6-19-2010		0000	Monthly checks	BA
(1) Wind speed data valid during these periods				

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
5-31-2010	0900	1600	Data not recorded	AN

TABLE 6 – WARM SPRINGS SITE INVALID DATA PERIODS (QUARTER 2, 2010)

Part A – PM10

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-21-2010	1100-1200	1800-1900	Monthly checks	BA
4-30-2010	1600	2300	Cleaned nozzle surface	BA
5-7-2010	1900		Repaired leak	BA
5-8-2010		0200	Repaired leak	BA
5-23-2010	0600	1300	Suspect snow effects	AM
5-26-2010	1200	1900	Monthly checks	BA
6-2-2010	1300	2000	Repaired leak	BA
6-15-2010	1700		Data not recorded	AN
6-16-2010		0000	Data not recorded	AN
6-18-2010	1500	2200	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
4-21-2010	1200	1900	Monthly checks	BA
5-23-2010	0200-0800	0900-1500	Instrument icing	AO
5-26-2010	1300	2000	Monthly checks	BA
6-15-2010	1700		Data not recorded	AN
6-16-2010		0000	Data not recorded	AN
6-18-2010	1500	2200	Monthly checks	BA

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
6-15-2010	1700		Data not recorded	AN
6-16-2010		0000	Data not recorded	AN

8.0 REFERENCES

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APPENDIX A

MONTHLY DATA SUMMARIES
SECOND QUARTER 2010

OPPORTUNITY DAILY DATA SUMMARY - APRIL 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)	Total Precip. (inches)
1	3	13	2.2	4.0	331	-2.0	2.9	-6.8	62	0.00
2	6	16	2.9	7.0	219	-0.8	5.8	-8.2	55	0.00
3	4	23	3.1	4.9	276	-0.8	2.7	-4.0	51	0.00
4	5	17	2.6	4.5	203	-0.1	6.3	-6.2	44	0.00
5	16	67	1.9	5.0	240	0.8	8.1	-5.8	60	0.01
6	4	30	2.7	4.6	302	-0.2	4.1	-3.7	60	0.02
7	7	23	2.6	4.9	246	1.8	9.1	-3.1	51	0.00
8	21	122	4.0	7.8	237	1.9	9.6	-3.8	48	0.00
9	8	33	2.4	4.3	243	-1.8	4.0	-8.0	41	0.00
10	14	46	1.4	2.8	112	0.7	11.1	-10.7	44	0.00
11	21	40	1.9	3.9	12	1.9	5.8	-1.9	56	0.00
12	28	51	2.1	4.2	23	2.2	8.6	-3.6	63	0.00
13	7	25	2.1	3.5	347	0.5	2.5	-1.4	81	0.24
14	11	67	3.0	5.5	257	4.9	11.2	-1.6	56	0.00
15	10	19	1.7	4.0	145	5.9	15.1	-3.1	54	0.00
16	14	32	2.6	5.4	157	9.0	19.1	-2.9	47	0.00
17	16	35	2.3	5.7	236	9.3	16.5	2.4	55	0.00
18	13	27	1.6	3.6	268	8.1	17.4	-0.8	55	0.00
19	15	31	1.5	2.9	54	9.6	21.0	-2.1	47	0.00
20	26	62	2.3	4.7	150	12.1	22.9	-1.3	48	0.00
21	25	99	2.2	4.0	159	12.6	21.5	1.0	51	0.00
22	18	68	3.7	7.1	NO DATA	10.0	16.3	4.7	65	0.00
23	16	45	3.3	5.8	NO DATA	6.7	12.5	-0.3	43	0.00
24	18	59	3.3	6.5	NO DATA	5.8	12.7	-2.6	47	0.00
25	6	29	2.5	4.1	NO DATA	2.0	6.5	-2.9	49	0.00
26	21	41	1.5	2.7	175	5.1	14.8	-6.7	46	0.00
27	59	255	2.9	6.4	186	9.9	17.2	3.8	48	0.05
28	4	12	3.8	5.6	268	3.5	4.7	1.6	50	0.00
29	11	56	4.1	6.2	260	0.8	1.9	-0.7	72	0.02
30	2	13	3.2	4.8	315	3.0	6.4	-0.1	66	0.00

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - MAY 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)	Total Precip. (inches)
1	8	85	3.4	4.8	294	3.7	6.4	1.8	60	0.00
2	2	15	3.5	5.1	276	4.5	8.5	0.7	50	0.00
3	42	250	5.0	10.2	235	5.0	11.9	-0.8	59	0.14
4	21	146	3.8	7.2	268	0.3	3.5	-4.8	44	0.00
5	21	114	3.0	6.7	359	-2.0	3.6	-10.7	58	0.00
6	11	30	3.0	5.2	350	-1.2	3.3	-4.2	66	0.00
7	9	33	1.5	3.8	174	1.1	8.3	-7.8	54	0.00
8	10	31	2.3	4.6	219	2.7	8.5	-6.6	58	0.00
9	6	28	1.8	4.2	348	4.4	11.6	-3.2	56	0.00
10	13	46	1.9	4.7	351	5.1	13.3	-4.5	58	0.00
11	52	258	5.8	7.9	9	5.5	9.0	3.1	62	0.00
12	15	41	2.2	4.7	11	5.3	11.1	-2.7	50	0.00
13	21	119	2.0	3.5	83	6.8	15.4	-4.2	45	0.00
14	22	63	2.0	3.4	191	10.8	20.5	0.3	39	0.00
15	21	82	1.8	3.9	293	11.1	18.4	1.6	45	0.00
16	15	45	1.7	2.6	186	13.8	22.4	3.2	41	0.00
17	27	50	2.2	4.9	192	15.4	23.6	7.6	40	0.00
18	22	81	2.3	4.6	238	14.3	20.7	8.9	53	0.13
19	10	38	2.1	3.5	270	12.3	18.2	7.3	58	0.00
20	9	65	3.1	5.6	308	5.6	11.0	1.1	64	0.16
21	5	23	2.0	4.9	235	5.0	11.5	-1.9	57	0.04
22	3	28	2.0	3.4	335	2.9	6.9	0.0	75	0.23
23	3	25	2.2	3.6	144	4.3	10.3	-2.6	66	0.13
24	1	12	2.6	4.2	8	3.9	5.4	2.5	81	0.17
25	4	25	1.7	3.1	176	8.0	13.4	2.5	58	0.00
26	12	33	2.4	6.0	137	9.8	16.8	-0.9	55	0.00
27	6	24	2.1	5.9	181	8.0	13.4	2.5	75	0.31
28	0	26	2.5	4.5	3	4.4	5.7	2.5	87	0.45
29	2	14	2.1	4.0	301	6.5	11.7	2.4	68	0.00
30	4	11	2.3	3.8	236	9.1	15.1	3.3	51	0.00
31	3	13	2.0	4.9	221	10.5	17.2	6.6	64	0.22

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - JUNE 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)	Total Precip. (inches)
1	4	32	1.4	2.9	100	10.0	15.5	5.2	73	0.46
2	4	14	2.0	3.6	203	11.9	15.9	6.1	67	0.00
3	5	20	2.6	4.2	281	10.5	14.6	5.8	60	0.00
4	4	23	2.4	5.1	217	9.9	14.4	5.0	68	0.00
5	4	17	2.2	3.9	287	11.4	17.9	5.7	51	0.00
6	8	32	1.7	3.6	193	11.9	18.5	5.4	62	0.09
7	3	20	1.9	4.6	295	10.3	13.5	6.5	70	0.10
8	8	19	1.8	4.0	179	11.5	19.6	2.7	51	0.00
9	17	45	2.1	5.0	325	11.6	17.9	6.0	59	0.04
10	1	16	1.8	3.4	356	6.8	11.2	2.1	78	0.72
11	2	19	2.1	4.3	357	7.1	12.0	2.8	72	0.19
12	7	31	2.5	5.0	357	8.4	15.3	-0.8	61	0.00
13	12	39	1.6	3.0	3	11.3	21.4	-0.3	50	0.00
14	18	48	2.0	4.0	26	14.7	22.8	3.6	47	0.00
15	3	22	1.7	3.1	187	10.5	14.9	6.7	78	0.61
16	2	19	1.7	3.5	326	7.9	10.9	5.6	84	0.94
17	2	8	2.8	5.9	266	5.8	8.2	3.6	68	0.10
18	3	18	2.3	3.8	287	10.3	16.2	4.8	57	0.00
19	8	45	1.7	4.4	334	11.3	19.2	2.4	66	0.00
20	7	31	1.9	6.2	235	10.7	16.9	4.0	69	0.03
21	10	36	2.5	4.0	259	11.3	16.0	5.6	61	0.00
22	8	23	1.8	3.9	354	11.3	18.4	2.1	64	0.00
23	15	32	1.7	3.2	211	15.1	24.2	3.8	55	0.00
24	22	46	1.6	3.4	211	16.6	23.4	8.8	53	0.00
25	18	157	1.6	2.7	237	15.4	22.0	10.8	62	0.03
26	8	35	2.2	3.3	260	16.2	22.2	9.2	48	0.00
27	12	28	1.6	3.1	24	15.8	23.6	5.6	51	0.00
28	21	50	1.6	2.8	209	19.1	29.6	5.9	43	0.00
29	60	326	2.6	5.2	185	21.4	28.5	14.2	43	0.02
30	13	37	1.9	4.8	6	15.0	20.6	8.9	71	0.02

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - APRIL 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	3	22	1.1	2.9	360	-2.1	5.3	-9.0	64
2	2	20	3.3	6.2	199	-0.1	7.8	-7.8	55
3	2	15	2.5	5.6	263	-0.7	3.5	-7.0	54
4	4	22	3.1	4.7	178	0.7	7.4	-6.6	44
5	9	22	1.7	3.7	209	1.5	8.6	-6.8	59
6	2	13	1.3	3.1	311	-0.1	4.9	-4.7	67
7	3	18	2.6	4.7	231	2.6	10.3	-3.3	52
8	5	22	4.8	7.3	215	2.7	10.0	-4.0	47
9	3	9	3.2	4.8	245	-0.8	5.4	-6.0	38
10	7	28	1.2	2.0	55	1.4	12.0	-10.8	46
11	8	17	1.3	2.3	14	2.5	6.9	-1.1	55
12	11	27	1.4	2.8	8	2.7	9.8	-3.8	64
13	3	15	1.5	2.9	203	1.0	3.3	-1.0	82
14	3	23	2.6	5.4	233	5.7	12.4	-0.5	56
15	8	31	1.3	2.3	141	6.4	16.9	-2.6	56
16	6	20	2.2	4.3	175	9.8	20.1	-2.0	48
17	8	22	1.9	5.4	200	9.8	17.2	3.2	57
18	9	21	1.4	2.8	204	9.0	18.6	0.9	56
19	9	22	1.3	2.1	151	10.9	22.2	-1.0	47
20	10	22	1.8	3.7	159	13.2	23.8	1.6	46
21	13	32	1.5	2.7	61	13.0	21.9	2.1	54
22	13	45	1.9	4.2	315	11.0	17.9	3.7	65
23	7	16	1.7	4.4	359	7.0	14.2	-1.2	48
24	5	20	3.2	6.8	265	6.5	14.2	-2.0	47
25	3	11	1.8	3.5	318	2.5	7.8	-4.4	50
26	7	25	1.4	2.7	179	5.4	16.7	-5.9	50
27	8	20	3.5	7.3	188	10.7	16.3	3.5	48
28	2	14	4.5	6.5	252	3.8	5.0	2.1	54
29	2	15	2.8	5.1	253	1.7	4.0	-0.2	67
30	2	13	2.5	5.9	324	4.2	9.1	0.3	62

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - MAY 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	3	20	2.3	4.5	303	4.2	7.6	0.5	62
2	1	16	2.6	5.9	265	4.5	10.4	-1.3	56
3	15	149	5.1	10.5	220	5.6	12.9	-1.2	60
4	3	16	4.3	6.2	260	0.5	5.3	-4.9	49
5	7	42	2.4	4.4	350	-1.4	4.7	-9.9	58
6	7	21	2.5	4.1	351	-0.2	4.6	-4.1	62
7	4	27	1.4	4.2	146	1.4	9.6	-7.7	55
8	4	18	1.8	3.8	208	3.4	9.9	-6.7	59
9	7	58	1.3	3.0	14	4.6	13.1	-4.0	58
10	4	23	1.8	5.6	348	6.1	14.8	-4.2	57
11	11	32	3.2	4.2	357	6.4	10.3	3.7	61
12	7	19	1.5	2.9	5	6.1	12.4	-1.1	51
13	6	15	1.6	2.4	103	7.8	16.5	-3.5	45
14	9	22	1.9	3.2	166	11.5	20.3	0.5	40
15	8	22	2.0	5.3	265	11.6	20.9	2.9	48
16	5	15	1.8	2.9	169	14.6	22.8	4.5	42
17	5	18	1.9	4.2	189	16.0	24.6	6.8	40
18	7	28	2.0	3.4	191	14.7	21.7	9.1	57
19	1	11	1.5	2.9	139	12.9	18.4	7.4	60
20	2	16	2.5	5.0	249	6.9	12.6	1.5	62
21	2	11	1.8	4.6	212	5.9	13.4	-1.4	56
22	1	10	1.6	3.8	304	3.9	8.3	0.5	74
23	3	17	1.8	3.4	160	5.4	11.1	-1.2	64
24	1	20	1.6	2.7	11	4.8	6.7	3.3	79
25	1	9	1.8	3.9	170	8.6	14.9	2.8	60
26	6	24	2.4	5.9	144	10.9	17.6	0.8	55
27	4	17	1.8	6.3	164	8.8	14.5	3.7	75
28	0	9	1.6	3.0	1	5.0	6.3	3.1	87
29	0	9	1.6	3.7	310	6.8	12.0	2.8	72
30	2	12	2.8	5.0	238	10.4	15.6	4.1	52
31	1	8	2.3	4.7	199	11.5	17.9	7.1	65

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - JUNE 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	2	16	1.5	3.0	171	11.0	16.9	5.9	72
2	2	16	2.9	5.2	196	12.8	16.8	6.9	68
3	2	21	3.2	5.8	273	11.6	16.4	6.1	60
4	1	19	2.6	4.4	204	11.1	15.5	6.5	67
5	3	25	2.2	4.8	276	12.3	18.9	6.3	53
6	4	17	1.8	3.6	168	12.8	19.9	6.2	62
7	3	22	1.9	3.2	224	11.0	15.5	5.4	73
8	2	12	1.7	3.1	154	12.2	21.2	1.9	53
9	6	17	1.6	2.7	148	12.2	17.9	7.7	63
10	2	19	1.4	3.2	197	7.9	13.5	3.9	78
11	3	17	1.7	3.6	352	8.2	13.8	3.4	71
12	6	27	1.8	3.5	353	9.2	17.0	0.1	62
13	6	37	1.4	2.0	80	12.6	23.0	2.0	52
14	11	49	1.4	1.8	23	15.4	23.8	4.2	51
15	6	41	1.6	3.2	180	11.2	16.8	7.8	81
16	2	18	1.1	2.0	48	8.6	11.7	6.0	88
17	4	61	3.4	5.8	274	6.5	8.5	3.5	71
18	4	29	1.5	2.6	310	11.4	17.6	4.7	58
19	6	24	1.4	3.0	325	11.8	20.0	4.7	70
20	6	29	1.7	4.0	211	11.4	18.0	4.3	73
21	5	54	2.4	4.8	220	12.6	19.1	5.5	62
22	5	26	1.3	2.6	346	12.0	19.6	3.6	67
23	6	29	1.8	3.4	187	15.6	25.1	5.8	58
24	8	33	1.8	3.5	200	17.2	24.2	10.0	55
25	7	21	1.9	2.9	211	15.7	22.3	11.7	66
26	5	24	2.4	4.2	246	16.7	23.5	9.4	52
27	4	20	1.4	2.0	76	16.1	24.5	5.8	56
28	6	25	1.8	3.4	190	19.5	29.7	8.5	46
29	20	146	2.9	6.9	174	21.5	27.5	14.7	45
30	9	32	1.3	2.4	0	15.4	21.3	9.5	74

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

APPENDIX B

DUST SAMPLE MEMORANDA

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MEMORANDUM – Opportunity / Warm Springs Ambient Dust Sampling Events

Sampling Period: March 28 – April 26, 2010 (Settled Dust and Dustfall)

Submitted by Steve Heck, Blacktail Consulting, Inc.

July 13, 2010

This memorandum describes the preliminary results of settled dust and dustfall sampling conducted at the Opportunity and Warm Springs air monitoring sites on behalf of Kuipers and Associates, and Anaconda-Deer Lodge County. All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan.

1. INTRODUCTION

Since the late summer of 2008, opportunistic settled dust and dustfall sampling has been conducted at the Opportunity and Warm Springs air monitoring sites to determine the trace metal content of airborne particulate that settles on outdoor surfaces. The settled dust samples have been collected by vacuuming settled particulate onto filter cassettes from clean glass dishes; after initial sample handling issues were resolved, these sampling events proceeded smoothly, with consistent analytical results.

The dustfall sampling was more problematic, for reasons that became apparent as sampling progressed:

- Initially, the entire contents of each dustfall jar (which included a large volume of liquid) were evaporated in a 2,000 ml glass beaker. The evaporated beakers were weighed on a 0.01-g resolution balance. This approach provided poor resolution, and consequently large uncertainty in particulate mass determinations.

- During the winter of 2008-2009, high-grade isopropyl alcohol was added to the dustfall jars in the field to prevent freezing. The alcohol was found to have minimal amounts of arsenic

and zinc. However, the large amount of alcohol used for each sample (due to rapid evaporation) introduced large uncertainties into the analytical results.

Both problems were resolved over the first few sampling episodes. However, another problem developed during the late spring: flying insects such as flies, gnats and bees – and occasionally airborne plant material –became trapped in the dustfall liquid, rendering reliable particulate mass determinations impossible. This problem continued through the summer and early fall, and samples collected during those seasons were not analyzed.

The third set of insect-free dustfall samples was collected over the period of March 28 to April 26, 2010. Settled particulate samples were also collected over the same period. This sampling episode is the third for which reliable comparisons can be made between dustfall and settled dust analytical results at the Opportunity and Warm Springs sites.

2. SAMPLE COLLECTION

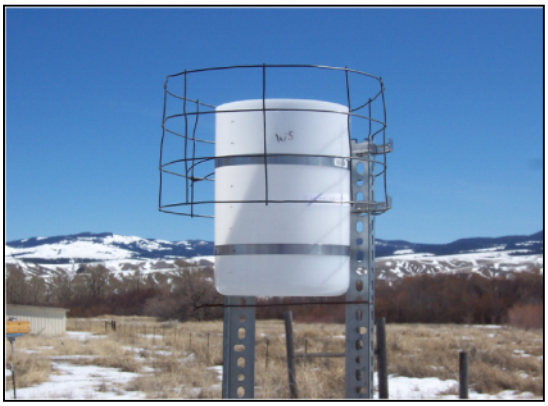
2.1 Settled Dust Samples

On March 28, 2010, four clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was either dumped or allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes. The filters were recommended by the manufacturer for applications involving trace element analyses. The matched filter weights allow one to avoid filter pre-weighing. The total dust determination is made by simply weighing the two filters following sampling; the difference in their weights equals the mass of dust collected.

The glass dishes were vacuumed for the last time on April 26, 2010, and the cassettes were submitted to the MSE Laboratory for analysis. Both samples were weighed to determine the total amount of particulate collected. Samples having a sufficient net dust mass (≥ 1.0 mg) were analyzed for arsenic, cadmium, copper, lead and zinc.

2.2 Dustfall Samples



On March 28, 2010, clean 6.75 inch diameter by 8.75 inch tall Nalgene (polypropylene) dustfall jars were installed at both sites at a height of approximately 8 feet to capture and retain settling dust. The jars were de-contaminated by the laboratory prior to use by cleaning them with laboratory soap, then rinsing them with nitric acid and deionized water. The jars were initially filled to a depth of 2 inches with deionized water (DI H_2O). The jars were inspected during twice-weekly site visits; DI H_2O was added as necessary to maintain a liquid level of at least an inch. At the end of the sampling period on April 26, 2010, the jars were covered with clean lids, and transported to the MSE laboratory for analysis.

Additionally, a dry dustfall jar was installed at the Opportunity site, and no was water added during the sampling period. The purpose of that sample was to determine whether dry jars could be used during the insect season to obtain reasonable dustfall data. Results for the dry jar were consistent with those for the wet jar for both arsenic and lead, as discussed in Section 5.1.

3. ANALYTICAL PROCEDURES

3.1 Settled Dust Samples

Following weighing, the filters and any particulate contents were digested using Method SW-846 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer (ICP-MS) using Method SW-846 6020A.

3.2 Dustfall Samples

After delivery to the laboratory, the dustfall jar contents were transferred into 2,000 mL beakers, which then were covered with watchglasses and evaporated in a convection oven at a temperature of 90 to 105ºC. After the liquid evaporated down to approximately 100-200 mL, the contents were transferred to pre-weighed 200-mL beakers and evaporated to dryness. The beakers then were weighed to within 0.0001 grams to determine a net particulate residue weight.

The residue was digested using SW-846 Method 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer ICP-MS using Method SW-846 6020A.

4. ANALYTICAL RESULTS

Table 1 presents analytical results for the settled dust results, while Table 2 presents results for the dustfall samples. Table 3 summarizes the results, including comparisons of those obtained from the settled dust versus dustfall sampling procedures. Important findings are summarized in Section 5, and recommendations for future sampling are made in Section 6.

4.1 Settled Dust Samples

4.1.1 Filter Weights

The filters were weighed on an enclosed balance with a resolution of 0.0001 grams (0.1 mg). Results are shown in Section A of Table 1. The "Tare" filter weight is the weight of the unexposed matched weight filter, and the "Exposed" weight is the weight of the filter dust was collected on. The net dust weight was calculated as the difference between these values.

The Opportunity sample contained 17.2 mg of dust, versus 84.6 mg for the Warm Springs sample. Both dust masses were sufficient for trace element analyses.

4.1.2 Trace Element Results

The trace element results are presented in Section B of Table 1. The "Total" results represent the trace element concentrations in the exposed filter – which includes contributions from both the filter material and the collected dust. Field Blank results are shown in the column labeled "Blank," and were consistent with previous data. The "Net" filter trace element concentrations were calculated by subtracting the blank values from the total values, and represent the average trace element concentrations throughout the filter based solely on the contribution from the collected dust.

4.1.3 Trace Element Concentrations in Dust

The net trace element concentrations in Section B are for the entire exposed filter mass. Trace element concentrations in the collected dust were calculated using the net trace element results, the exposed filter weight and the collected dust weight. For the Opportunity sample, the net dust weight was 0.0172 grams, while the total weight of the exposed MCE filter was 0.0637 grams. The following example illustrates the calculation used to determine trace element concentrations in the collected dust:

- Concentration of arsenic over the entire exposed filter was 13.8 mg/kg. Therefore, the amount of arsenic present was 13.8 mg/kg x 0.0637 g, or 0.879×10^{-3} mg.
- Because all of this net arsenic concentration was contained in the dust portion, the arsenic concentration in dust was 0.879×10^{-3} mg / 0.0172 g, or 51.1 mg/kg.

The concentrations of other trace elements in the dust were calculated in the same manner. Results are summarized in Section C.

Disassembly and weighing of the filter cassettes proceeded smoothly for these samples, and no analytical issues were encountered.

4.2 Dustfall Samples

4.2.1 Trace Element Results

The raw trace element results are presented in Part A of Table 2. They show the trace element concentrations in the liquid as received by the laboratory, the volume of liquid initially evaporated, and the net weight of solids after evaporation.

The total trace element masses in each sample were calculated by multiplying the concentrations in the sample liquid by the volume of liquid as received by the laboratory. Those results are shown in Part B of Table 2.

4.2.2 Trace Element Concentrations in Dustfall Particulate

The trace element concentrations in the collected particulate were calculated by dividing the trace element masses by the total amount of particulate collected in each sample. Results are shown in Part C of Table 2.

4.2.3 Calculation of Total Dustfall Rate

Dustfall is expressed in units of g/m^2/month, and is calculated by dividing the mass of particulate collected by the cross-sectional area of the dustfall jar, and adjusting that result to account for the number of days the sample was actually collected over. With a diameter of 6.75 inches, the dustfall jars have a cross-sectional area of 35.78 in^2, or 0.0231 m^2. The calculated dustfall rates were as follows, with reasonable agreement between the wet (A) and dry (B) jars at Opportunity:

Sampling Period	Opportunity-A		Opportunity-B		Warm Springs	
	g/m^2	g/m^2/month	g/m^2	g/m^2/month	g/m^2	g/m^2/month
3/28/2010 – 4/26/2010	0.64	0.69	0.77	0.83	0.41	0.44

The values for all three samples were well below the Montana settleable particulate (dustfall) standard of 10 g/m^2/month.

5. SUMMARY

Table 3 compares the settled dust and dustfall results for both sites. Overall, results obtained from the two methods were fairly consistent.

5.1 Opportunity Site

At the Opportunity site, results for arsenic, cadmium, copper and lead were of similar magnitude for both methods. However, the zinc concentration for the dustfall sample was roughly twice that for the settled dust sample. Both the arsenic and lead results were somewhat lower than what was observed in most prior sampling events, but still of the same magnitude.

The wet (A) and dry (B) dustfall jar results for Opportunity were similar for arsenic, copper and lead. The zinc concentration was over 50% higher in the dry jar, while the cadmium concentration was higher by a factor of three. The explanation for this behavior is unknown. However, the results suggest that dry jars can be used to determine arsenic and lead concentrations during periods when trapping of insects by water-filled jars is a problem.

5.2 Warm Springs Site

At the Warm Springs site, concentrations for all elements were higher in the dustfall samples than for the settled dust sample. The arsenic concentration for the settled dust sample was lower than for the corresponding sample at Opportunity, while the lead concentration was nearly equal. The arsenic concentration in the dustfall sample at Warm Springs was slightly higher than for the corresponding sample at Opportunity, while the lead concentration was over twice as high. Both the arsenic and lead results were similar in magnitude to what was observed in prior sampling events.

6. RECOMMENDATIONS FOR FUTURE SAMPLING

6.1 Settled Dust Sampling

The settled dust sampling is providing consistent, reliable results, and will continue to be performed in the current manner. A set of duplicate settled dust samples is being collected at the Opportunity site during the summer of 2010, when ambient particulate levels are typically at their highest.

6.2 Dustfall Sampling

Since isopropyl alcohol is no longer being used in the dustfall jars, the sample collection cost is minimal. Therefore, dustfall samples will continue to be collected at both sites concurrent with the settled dust sampling events. Dustfall samples will be submitted for analysis only if they are free of insect and plant material that could compromise dust mass determinations.

It is believed that the presence of water in the dustfall jars attracts insects, which can subsequently become trapped. For the Opportunity sampling event discussed herein, one jar was

prepared in the normal manner, while a second was installed with no water ("dry"). Results for the two jars indicated similar dust retention, and similar analytical results for arsenic and lead. The use of dry jars will continue when flying insects are prevalent. While this practice can help reduce trapping of insects, it is no guarantee during very wet periods. As a case in point, a set of dry jars was installed on April 28 and allowed to collect particulate until July 2. Both May and June of 2010 were very wet, so that the jars contained between one and three inches of water at most times solely from rain. Consequently the jars were not analyzed due to the overwhelming presence of trapped insects.

TABLE 1 - OPPORTUNITY / WARM SPRINGS SETTLED DUST SAMPLE RESULTS
(Sampling conducted 3-28-2010 through 4-26-2010)

A. Filter Weight Data

Opportunity Analyzed Filter Weight (g)	0.0637
Opportunity Tare Filter Weight (g)	0.0465
Opportunity Net Particulate Weight (g)	0.0172
Warm Springs Analyzed Filter Weight (g)	0.1267
Warm Springs Tare Filter Weight (g)	0.0421
Warm Springs Weight (g)	0.0846

B. Trace Element Results

	Opportunity			***Warm Springs***			***Blank*** (1)
Analyte	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Conc. (mg/kg)
As	13.8	13.8	1.04	20.9	20.9	0.844	ND
Cd	0.561	0.561	0.069	1.09	1.09	0.056	ND
Cu	101	100	0.868	114	113	0.703	0.799
Pb	19.0	18.8	0.139	49.2	49.0	0.112	0.159
Zn	121	101	2.08	221	201	1.69	20.0

(1) Unexposed clean filter

C. Calculated Trace Element Concentrations in Particulate

	Opportunity			***Warm Springs***		
Analyte	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)
As	13.8	***51.1***	3.85	20.9	***31.3***	1.26
Cd	0.561	***2.08***	0.256	1.09	***1.63***	0.084
Cu	100.2	***371***	3.21	113	***170***	1.05
Pb	18.8	***69.8***	0.515	49.0	***73.4***	0.168
Zn	101	***374***	7.70	201	***301***	2.53

(1) Reporting Limit adjusted to reflect mass of particulate collected

TABLE 2 -- SUMMARY OF OPPORTUNITY / WARM SPRINGS DUSTFALL RESULTS
(Samples collected from 3-28-2010 to 4-26-2010)

A. Analytical Results

Analyte	Opportunity-A (ug/L)	Opportunity-B (ug/L)	Warm Springs (ug/L)
As	1.79	4.54	1.02
Cd	0.061	0.430	0.033
Cu	7.62	23.7	6.13
Pb	2.11	4.63	2.12
Zn	17.4	73.2	10.6
Sample Volume (mL)	534	260	762
Solids Weight (mg)	14.8	17.9	9.5
Solids (mg/L)	27.7	68.8	12.5
ND = Not Detected; NA = Not Applicable			

B. Trace Element Weight

Analyte	Opportunity-A Total (ug)	Opportunity-B Total (ug)	Warm Springs Total (ug)
As	0.956	1.18	0.777
Cd	0.033	0.112	0.025
Cu	4.07	6.16	4.67
Pb	1.13	1.20	1.62
Zn	9.29	19.0	8.08

C. Trace Element Concentrations in Particulate

Analyte	Opportunity-A mg/kg	Reporting Limit mg/kg	Opportunity-B mg/kg	Reporting Limit mg/kg	RPD % A vs B
As	**64.6**	5.07	**65.9**	4.19	**2.08**
Cd	**2.20**	0.338	**6.25**	0.279	**95.8**
Cu	**275**	4.22	**344**	3.49	**22.4**
Pb	**76.1**	0.676	**67.3**	0.559	**12.4**
Zn	**628**	10.1	**1063**	8.38	**51.5**

Analyte	Warm Springs mg/kg	Reporting Limit mg/kg
As	**81.8**	7.89
Cd	**2.65**	0.526
Cu	**492**	6.58
Pb	**170**	1.05
Zn	**850**	15.8

TABLE 3 – SUMMARY OF SETTLED DUST / DUSTFALL SAMPLING RESULTS

Analyte (mg/kg)	Opportunity			Warm Springs	
	Settled Dust	Dustfall-A	Dustfall-B	Settled Dust	Dustfall
As	51.1	64.6	65.9	31.3	81.8
Cd	2.08	2.20	6.25	1.63	2.65
Cu	371	275	344	170	492
Pb	69.8	76.1	67.3	73.4	170
Zn	374	628	1063	301	850
Dustfall Rate (g/m^2/month) (1)	N/A	0.69	0.83	N/A	0.44
(1) Based on a 30-day month					

APPENDIX C

E-BAM PERFORMANCE CHECK / MAINTENANCE PROCEDURES SECOND QUARTER 2010

1.1 Performance Check / Maintenance Procedures

1.1.1 E-BAM Sampler

Several checks are performed on the E-BAM sampler, including both its particulate monitoring system and the internal barometric pressure sensor.

1.1.1.1 Leak Check (E-BAM Manual Section 2.4.1.1)

Each month, the E-BAM sampler is checked for leaks in the sampling train that could compromise data integrity. This check is performed by installing a BX-302 valve/filter assembly in place of the sampling inlet, and running the sampler in its "pump test" mode while slowly closing the valve. The check is considered satisfactory if the flow drops to below 1.5 LPM.

1.1.1.2 Operating Flow Rate Check (E-BAM Manual Section 2.4.1.5)

The operating flow rate check is performed monthly by installing an NIST-traceable BGI Delta-Cal flow monitor in place of the sampling inlet, and comparing the indicated flow against the target of 16.7 LPM. The check is considered satisfactory if the indicated flow is within +/- 2% of the target value. Otherwise, the flow is adjusted at set points of 14.0 LPM and 17.5 LPM, and the operating flow re-checked.

A successful operating flow rate check, when preceded by a successful leak check, proves that the E-BAM sampler is collecting valid PM_{10} data.

1.1.1.3 Pump Test (E-BAM Manual Section 2.4.1.7)

This test was discontinued during the third quarter of 2009, because experience has shown it to be of little value for indicating when a pump is nearing the end of its operating life.

1.1.1.4 Zero/Span Check (E-BAM Manual Section 2.4.3.1)

Zero and span membrane plates supplied with each sampler are used quarterly to check the calibration of the E-BAM sampler's beta attenuation detector (The manual indicates this check is not required until after 6 months of operation). These plates simulate specific particulate loads when used in conjunction with a blank filter tape. The checks are performed within the E-BAM sampler's "membrane test" menu, which directs the user to install and remove the plates at specified times. At the conclusion of the test, the display screen indicates whether the calibration test was successful. The membrane plates are certified by the manufacturer.

1.1.1.5 Clean Valve and Nozzle (E-BAM Manual Section 2.4.5)

The sampler's sample inlet nozzle (located directly above the filter tape) and vane (located directly beneath the filter tape) are cleaned monthly with a modified Q-tip using isopropyl alcohol. Care is taken that no excess alcohol drips into the vane assembly, which could affect

the unit's calibration. Immediately after performing this maintenance, the leak check described in Section 1.1.1.1 is repeated to ensure that the sample train integrity was not compromised.

1.1.1.6 Clean PM_{10} Inlet (E-BAM Manual Appendix H)

Each month the PM_{10} inlet is removed from the sampler, disassembled and cleaned using paper towels and isopropyl alcohol. Additionally, all o-rings are lubricated with stopcock grease as necessary.

1.1.1.7 Barometric Pressure Sensor Check (E-BAM Manual Section 2.4.1.4)

The E-BAM's internal barometer is checked monthly using a Wallace and Tiernan aneroid barometer that is routinely checked against a mercury wall barometer. If the results agree within +/- 2 mmHg, no adjustment is necessary.

1.1.2 Meteorological Sensors

1.1.2.1 Temperature (E-BAM Manual Section 2.4.1.3)

The E-BAM manual specifies a two-point calibration procedure using an ambient temperature and an ice bath. However, the manufacturer indicated that a single-point field calibration check was generally sufficient. Disassembly of the sensor for placement in an ice bath is not trivial, and is impractical as a routine field activity.

The temperature sensor is checked monthly at ambient conditions using an Assmann Psychrometer that has been certified against an NIST-traceable mercury thermometer. If the readings agree to within 0.5 degrees Celsius, no adjustment is necessary.

1.1.2.2 Relative Humidity (Model 593 Relative Humidity Sensor Operation Manual)

The Model 593 Manual indicates that recalibration (requiring additional specialized equipment) is required only if the sensor element is replaced in the field. For this project, calibration of the relative humidity sensor will be limited to monthly collocated checks using an Assmann Psychrometer that is certified against an NIST-traceable mercury thermometer. Wet-bulb and dry-bulb temperatures, together with ambient barometric pressure, are used with psychrometric tables to calculate a true relative humidity, which is compared against the E-BAM display. If the indicated relative humidity agrees with that obtained by the Assmann psychrometer to within +/- 5% relative humidity, the results are considered acceptable. If consistently unacceptable results are obtained, the relative humidity sensor will be returned to the manufacturer for re-calibration and/or repair.

1.1.2.3 Wind Speed (Model 034B Wind Sensor Operation Manual)

The Model 034B Manual recommends an initial check of the unit's response to a known rotation rate. This is being done monthly in the field using a 300 rpm synchronous motor to produce a known wind speed of 18.49 mph (8.27 m/s). The manual specifies an accuracy of +/- 0.25 mph

(0.11 m/s) at speeds below 22.7 mph (10.1 m/s). Additionally, the response of the sensor when stopped is observed; it should be 0.3 +/- 0.1 m/s.

1.1.2.4 Wind Direction (Model 034B Wind Sensor Operation Manual)

The manual does not specify routine checks for the wind direction sensor, beyond an initial check to confirm that the sensor's readout increases from 0 to 360 degrees as the shaft is turned clockwise. However, routine checks are performed monthly to verify proper operation. First, the sensor's alignment is verified by locking the sensor in place with its alignment pin, and ensuring that a response of between 178 and 182 degrees is obtained. Next, the sensor's linearity is verified by turning it in 90-degree intervals (using the sensor crossarm as a visual reference), and confirming that the E-BAM display's direction indication changes by 90 +/- 3 degrees with each step.

The initial orientation of the sensor was performed using a solar sighting in conjunction with NIST time (WWV) to establish precise direction azimuths. The use of solar sightings – rather than magnetic compass readings – negates any localized magnetic influences.

1.1.2.5 Filter Temperature and Humidity (E-BAM Manual Sections 2.4.2.1 and 2.4.2.2)

The E-BAM Manual includes provisions for adjusting the response of both of these parameters. However, there is no practical way to accurately check either parameter with an external reference standard. Therefore, checks of these parameters will be limited to review of downloaded data files for suspicious behavior.

1.2 Performance Check Results

Each set of performance check results is presented in Appendix D. Results obtained during the second quarter of 2010 were satisfactory

APPENDIX D

E-BAM PERFORMANCE CHECK RESULTS

OPPORTUNITY SITE

	DATE	4/21/2010	5/26/2010	6/18/2010
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1235	1305	1602
	EBAM BACK ON-LINE@	1350	1340	1640
	Reason	Monthly checks	Monthly checks	Monthly checks
	Comments			
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	20.0	16.7	16.1
	Audit	19.8	16.4	16.1
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	30%	39%	48%
	Audit (Td/Tw)	19.8 / 10.0	16.4 / 8.7	16.1 / 9.7
	Audit RH	30.2%	37.7%	46.5%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	1.1	1.5	1.6
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	626.0	632.1	635.6
	Audit	625	632	635
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated	180	180	179-180
	(with pin locked)			
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	154	155	156
	+90 degrees	244	245	247
	+180 degrees	333	337	336
	+270 degrees	64	66	68
	+360 degrees	155	154	155
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.7 LPM	0.8 LPM	0.8 LPM
	Leak repaired?	N	N	N
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.93	16.81	16.75
	As left	NA	NA	NA
	(if recalibrated)			
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	NA	NA	NA
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	0.348 (Pass)	NA	NA
	Span Pass/Fail	0.921 (Pass)	NA	NA
Confirm Leak Check (after maintenance)	Result	0.8 LPM	0.8 LPM	0.8 LPM
	Leak repaired?	N	N	N

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

WARM SPRINGS SITE

	DATE	4/21/2010	5/26/2010	6/18/2010
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1025 MST	1105 MST	1402 MST
	EBAM BACK ON-LINE@	1145 MST	1150 MST	1457 MST
	Reason	Monthly checks	Monthly checks	Monthly checks
	Comments		A	A
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	18.5	16.3	16.3
	Audit	18.0	15.9	16.1
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	34%	36%	41%
	Audit (Td/Tw)	18.0 / 9.3	15.9 / 8.0	16.1 / 9.1
	Audit RH	33.8%	35.3%	42.0%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	0.7	2.8	2.7
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	629.4	635.1	638.6
	Audit	629	635	638
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	178-179	179-180	179
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	189	190	191
	+90 degrees	279	278	280
	+180 degrees	8	11	12
	+270 degrees	100	100	100
	+360 degrees	190	190	190
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.5 LPM	0.5 LPM	0.5 LPM
	Leak repaired?	NA	YES	YES
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.68	16.62	16.72
	As left (if recalibrated)	NA	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	X	X	X
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	0.361 (Pass)	NA	NA
	Span Pass/Fail	0.951 (Pass)	NA	NA
Confirm Leak Check (after maintenance)	Result	0.5 LPM	0.5 LPM	0.5 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Noted very small pinholes in tape before cleaning surface. Leakage <1.5 LPM, so had no effect on data

APPENDIX E

AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES
SECOND QUARTER 2010

Opportunity Site April 2010 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	4	10	-5	0	2	-1	8	1	13	7	-2	-2	1	7	10	1	8	-1	3	3	5	-3	-1	0	24	2.8
2	5	9	0	-4	8	-5	9	4	2	0	0	2	15	12	16	12	5	4	13	14	0	2	7	2	24	5.5
3	2	0	19	23	-4	-2	2	-2	-2	1	0	4	1	8	3	8	1	5	6	0	6	6	-2	5	24	3.7
4	-3	-1	9	0	-2	-5	4	0	1	3	12	3	0	12	-1	4	11	8	14	12	12	17	7	7	24	5.2
5	20	6	12	20	9	16	13	13	10	39	27	17	9	16	17	17	13	10	17	13	-5	67	6	5	24	16.1
6	-3	22	-5	2	-5	15	-5	19	0	1	0	3	1	6	13	10	-2	1	30	2	-2	1	6	-4	24	4.4
7	5	-5	14	-5	5	4	1	7	3	-4	4	3	3	1	15	23	11	10	10	10	21	23	7	11	24	7.4
8	4	2	2	6	3	-1	12	2	5	42	36	11	122	55	47	19	55	21	24	3	11	6	6	9	24	20.9
9	6	10	16	-3	6	-5	3	0	0	3	1	0	-1	15	8	33	27	6	4	9	13	15	9	7	24	7.6
10	46	26	-5	18	-5	10	14	5	-5	9	7	7	13	2	14	7	5	11	11	18	10	39	33	40	24	13.8
11	26	23	29	19	19	8	22	21	17	18	38	37	31	40	26	19	19	23	11	18	12	13	10	4	24	21.0
12	2	7	14	18	13	30	30	51	35	39	39	51	41	41	43	30	38	28	45	37	22	-3	18	10	24	28.3
13	14	18	6	-5	25	8	12	17	15	23	22	9	-5	8	-1	3	-2	9	-5	4	-2	3	2	-2	24	7.3
14	-5	10	0	2	-2	-5	0	2	0	3	4	3	6	29	34	67	24	18	6	13	9	10	13	12	24	10.5
15	17	18	-5	2	7	8	7	12	1	16	11	8	8	10	9	4	9	15	14	18	15	11	19	3	24	9.9
16	25	13	3	27	-5	17	4	3	12	7	4	14	15	6	18	16	22	11	18	22	32	20	23	19	24	14.4
17	12	12	23	13	18	26	7	8	19	22	32	23	15	11	9	13	15	1	12	18	35	18	4	25	24	16.3
18	16	7	19	1	-5	8	27	0	11	13	7	5	12	21	26	12	14	10	19	19	22	17	17	21	24	13.3
19	-3	-4	31	11	-5	9	21	3	5	31	16	22	17	13	17	8	16	10	17	26	30	27	13	17	24	14.5
20	3	-5	26	4	-1	9	25	9	28	31	20	38	21	30	23	19	26	47	49	59	62	44	36	26	24	26.2
21	23	15	20	-2	39	-5	38	16	20	17	18	41	BA	BA	30	30	33	19	19	24	21	99	17	20	22	25.1
22	4	11	19	5	2	10	19	15	8	6	18	22	24	49	56	68	49	16	16	3	15	-5	8	-1	24	18.2
23	7	4	3	15	24	29	18	45	29	23	26	17	23	12	5	11	8	4	7	12	8	9	16	23	24	15.8
24	4	21	16	11	11	20	12	10	59	51	20	32	13	7	20	49	7	6	17	0	10	10	5	32	24	18.5
25	-5	14	8	14	4	-3	29	-5	3	6	-5	3	10	7	8	8	4	3	7	3	8	20	12	1	24	6.4
26	36	11	-4	12	6	22	3	10	41	36	15	26	7	23	14	11	17	21	25	40	40	40	23	18	24	20.5
27	25	21	20	23	4	12	51	72	80	255	176	73	44	54	162	78	33	43	129	17	-4	30	1	15	24	58.9
28	0	5	7	3	-1	2	0	7	0	12	9	8	11	6	8	8	3	-1	9	-1	2	5	2	0	24	4.3
29	5	7	5	5	7	8	34	31	56	41	24	24	0	26	3	4	-2	-4	5	-2	2	-1	-4	-5	24	11.2
30	13	2	-5	4	8	-5	13	0	-3	5	2	9	-5	9	0	4	-1	-2	-2	2	-5	6	-2	-2	24	1.9
NO.	30	30	30	30	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	30	30	30	30	30		
MAX.	46	26	31	27	39	30	51	72	80	255	176	73	122	55	162	78	55	47	129	59	62	99	36	40		
AVG.	10	10	10	8	6	8	14	13	15	25	19	17	16	18	22	20	16	12	18	14	14	18	10	11		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Opportunity Site May 2010 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	4	-5	-4	18	7	4	-4	-1	-5	3	-5	4	-1	4	14	85	20	27	20	8	3	-2	-1	3	24	8.2
2	-1	-4	2	-3	3	-5	4	0	1	6	4	-2	10	6	1	15	0	-3	5	-4	3	8	-1	-1	24	1.8
3	8	3	3	2	6	9	10	1	39	56	211	250	43	46	30	21	-5	18	54	45	46	40	45	36	24	42.4
4	146	133	8	3	6	3	9	14	9	3	5	17	28	30	29	9	1	5	4	9	-1	3	13	12	24	20.8
5	-1	14	4	28	-5	11	7	3	12	8	5	11	7	24	29	6	9	53	67	24	114	51	29	-2	24	21.2
6	29	3	30	15	13	14	20	9	7	3	-1	8	6	10	9	21	7	13	6	-5	27	-5	8	6	24	10.5
7	-5	21	1	-3	33	9	-1	1	-2	9	6	24	5	10	12	0	12	12	10	15	13	13	13	7	24	9.0
8	1	31	5	4	17	-5	7	7	15	10	14	2	21	7	9	6	31	15	13	13	-1	-5	20	2	24	10.0
9	-1	28	5	13	-5	-2	19	1	-3	5	4	3	5	-4	9	2	-1	-1	20	5	5	17	18	0	24	5.9
10	19	-5	1	20	9	21	5	4	7	17	13	20	9	14	22	46	15	26	18	19	3	16	-5	-3	24	13.0
11	8	-1	1	4	-1	-2	14	14	258	157	112	82	70	159	179	92	25	16	9	11	14	11	3	11	24	51.9
12	10	8	11	14	2	10	19	15	9	18	22	13	12	7	16	16	13	15	2	21	24	41	27	4	24	14.5
13	11	18	9	3	9	11	3	2	26	36	19	25	25	119	23	17	16	14	13	16	50	17	12	16	24	21.3
14	16	21	10	16	12	11	15	28	36	24	26	12	9	30	22	24	15	22	63	27	36	34	10	11	24	22.1
15	17	21	13	19	17	11	6	21	24	8	31	9	31	27	82	6	10	25	13	18	24	23	15	23	24	20.6
16	10	5	18	-5	12	25	7	11	24	15	11	23	12	37	9	10	11	1	45	25	22	10	15	11	24	15.2
17	13	14	13	6	24	13	15	31	50	39	26	17	20	47	47	46	25	17	19	49	37	34	27	13	24	26.8
18	14	22	25	16	31	17	5	41	43	18	48	22	81	33	39	12	15	18	13	7	-5	3	9	-2	24	21.9
19	-5	0	10	-2	14	13	10	5	18	3	30	2	11	26	38	12	5	5	8	14	16	7	2	-4	24	9.9
20	13	9	13	-5	3	65	1	-5	2	14	1	1	13	23	13	5	9	0	12	12	0	-2	7	9	24	8.9
21	-5	-1	1	1	3	23	-2	7	-3	1	7	9	5	9	-1	13	9	8	20	5	-5	20	-5	9	24	5.3
22	-4	6	2	-2	-5	9	5	-5	11	1	10	-5	8	6	6	1	28	-5	6	2	-3	2	9	-2	24	3.4
23	-3	12	-5	2	15	AM	25	-4	-1	7	-4	-5	11	-5	5	3	-3	-2	3	2	-2	6	1	0	23	2.5
24	7	-5	4	8	10	0	4	-5	-5	0	-2	-3	12	-4	-5	9	0	-1	0	5	-5	10	-5	3	24	1.3
25	-5	9	-5	8	4	0	5	-4	2	0	1	6	5	2	1	1	7	3	6	6	10	16	25	0	24	4.3
26	18	6	-5	33	-3	20	-5	6	12	0	10	5	16	BA	21	21	16	21	25	24	9	15	2	8	23	12.0
27	2	-4	13	1	10	14	16	10	12	-3	-5	24	-3	19	-4	7	19	0	8	-5	15	9	5	-5	24	6.5
28	26	-5	4	-5	-2	9	-5	-5	1	1	-3	8	-3	-5	-3	5	-5	-5	0	-4	6	-1	-5	-5	24	0.0
29	-1	8	-5	6	-5	14	4	-5	0	2	-2	-2	2	11	-2	7	-1	1	3	-2	7	-1	0	-1	24	1.6
30	11	-3	1	7	-1	7	-2	-5	4	9	5	-5	2	7	4	1	8	11	0	8	6	7	11	-4	24	3.7
31	0	4	4	3	5	-5	9	-5	AN	3	10	0	10	-5	11	11	1	13	6	0	-5	6	-1	3	23	3.4
NO.	31	31	31	31	31	30	31	31	30	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31		
MAX.	146	133	30	33	33	65	25	41	258	157	211	250	81	159	179	92	31	53	67	49	114	51	45	36		
AVG.	11	12	6	7	8	11	7	6	20	15	20	19	16	23	21	17	10	11	16	12	15	13	10	5		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Opportunity Site June 2010 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	2	11	-5	32	-5	20	-3	-4	-5	0	4	8	-5	13	-5	19	-5	10	-5	-2	3	8	13	-4	24	4.0
2	0	0	9	-5	2	5	9	-1	-3	11	3	13	7	5	5	3	10	-3	-1	-2	4	5	-5	14	24	3.5
3	-5	11	0	-5	9	5	-5	5	-2	2	9	16	11	8	13	7	7	-3	4	5	2	4	8	20	24	5.3
4	-2	-5	15	3	-3	-5	9	-3	23	-2	5	14	-2	6	10	8	5	-4	6	9	6	-1	5	-5	24	3.8
5	-1	-3	0	-5	17	-3	-5	-2	3	7	-4	8	-3	4	3	1	6	12	3	4	14	9	13	13	24	3.8
6	5	-5	22	-4	15	8	8	3	12	10	32	4	14	10	25	4	10	4	2	1	-5	6	-2	1	24	7.5
7	12	7	-1	2	-4	15	1	3	-5	1	14	-1	4	20	2	-5	-5	5	-3	3	10	-5	7	5	24	3.4
8	5	3	0	4	-5	5	11	9	-1	11	2	6	18	11	14	11	12	14	16	11	12	19	7	8	24	8.5
9	6	10	2	7	0	6	32	31	45	27	38	27	28	11	10	5	22	16	16	34	19	-5	-3	13	24	16.5
10	-5	-5	14	-3	-5	9	-1	-5	8	-2	7	-4	-5	4	3	16	4	-1	2	9	-5	0	0	-5	24	1.3
11	-5	1	6	-4	4	0	3	19	4	-5	-2	-5	3	-5	-5	6	5	1	5	6	9	11	9	-4	24	2.4
12	2	6	13	-5	5	9	6	0	7	2	2	2	5	7	3	5	8	11	3	10	31	-3	21	10	24	6.7
13	15	0	7	4	4	-4	17	-5	2	9	3	5	2	5	39	36	32	17	36	18	23	5	11	9	24	12.1
14	-5	8	9	8	2	10	10	9	20	13	16	15	13	42	25	35	25	25	28	12	19	14	48	29	24	17.9
15	-3	-5	18	7	0	-5	3	17	4	4	6	4	2	1	4	2	-5	-5	22	-5	4	16	-5	-2	24	3.3
16	10	-4	11	-5	3	-3	-2	9	15	8	-3	-5	7	1	19	-2	-5	7	-5	1	-1	2	0	-2	24	2.3
17	3	4	-5	-3	6	6	6	-5	5	7	0	5	0	8	4	-4	2	4	3	4	-3	4	-5	1	24	2.0
18	-5	2	2	10	-5	-4	4	18	3	0	5	5	-3	4	1	-5	BA	3	8	5	14	9	-5	10	23	3.3
19	-2	4	17	-5	-5	45	-5	5	13	4	2	15	-1	-2	8	6	13	37	-5	11	7	-5	26	2	24	7.7
20	2	31	3	-5	28	11	5	-1	1	11	3	10	10	7	24	7	7	9	4	-3	11	6	-2	-5	24	7.3
21	17	4	-3	-5	7	36	-3	31	13	35	15	18	15	16	-4	7	-5	12	13	4	12	-2	-2	2	24	9.7
22	3	21	2	8	-5	10	16	3	5	0	-4	-5	6	16	16	0	4	0	20	10	23	8	21	10	24	7.8
23	6	-4	12	1	23	32	7	26	16	23	10	14	24	31	24	-5	8	27	15	16	9	18	12	18	24	15.1
24	1	19	-4	10	15	4	43	29	42	46	35	21	17	43	17	20	22	34	29	29	16	11	20	6	24	21.9
25	8	-5	32	32	-2	15	1	20	26	157	21	16	13	43	2	15	-5	4	9	8	-5	24	-5	19	24	18.5
26	3	0	6	-5	1	9	0	3	2	10	9	13	4	15	6	19	2	11	16	7	18	10	35	2	24	8.2
27	20	8	15	10	9	17	-1	2	10	8	8	9	7	19	1	11	11	7	18	14	28	22	20	15	24	12.0
28	13	16	-4	20	-5	26	11	26	50	29	9	20	30	38	28	26	40	19	23	26	19	17	14	1	24	20.5
29	14	94	66	52	91	56	42	25	50	57	58	16	29	68	326	8	43	56	49	58	35	24	12	118	24	60.3
30	25	-5	23	2	-2	8	3	37	-5	9	12	15	13	15	31	20	9	16	16	26	14	11	13	11	24	13.2
NO.	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30	30		
MAX.	25	94	66	52	91	56	43	37	50	157	58	27	30	68	326	36	43	56	49	58	35	24	48	118		
AVG.	5	7	9	5	7	11	7	10	12	16	11	9	9	15	22	9	10	12	12	11	11	8	9	10		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Warm Springs Site April 2010 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	11	-1	-5	6	4	-1	-1	-4	20	14	2	2	22	9	9	-5	5	-2	2	-1	0	0	-5	-3	24	3.3
2	12	20	-5	-3	2	-3	2	3	0	-1	0	-5	10	-3	4	-2	0	12	-1	3	2	7	-3	2	24	2.2
3	7	5	-3	15	-4	12	-2	-2	8	-5	-2	6	-2	2	7	-5	9	-3	4	-5	1	7	1	1	24	2.2
4	2	-2	-5	6	-3	7	0	-5	6	2	9	2	4	13	-5	5	5	2	-5	3	6	9	9	22	24	3.6
5	8	9	15	0	16	11	16	4	19	15	15	9	6	12	22	6	4	9	9	8	14	-5	4	-3	24	9.3
6	9	6	-3	-5	11	10	5	0	-1	2	13	-4	-4	8	-3	7	-5	-5	5	-5	12	-5	1	10	24	2.5
7	1	-5	3	3	-1	-4	-5	5	7	-1	4	-1	5	-2	11	3	4	-2	10	0	-5	4	12	18	24	2.7
8	-2	5	6	5	3	-3	2	9	5	15	3	3	22	-5	4	4	8	10	4	5	1	7	4	5	24	5.0
9	6	4	7	1	1	0	-4	-3	4	5	1	2	6	0	3	9	2	3	8	-2	-4	-2	4	9	24	2.5
10	12	7	2	-5	28	6	2	0	1	10	13	3	4	11	11	7	4	8	-1	3	4	11	16	22	24	7.5
11	13	5	12	17	10	2	13	3	6	13	13	9	12	8	10	8	6	5	6	9	3	8	8	2	24	8.4
12	8	3	2	7	13	-5	-5	17	4	19	4	21	23	12	27	15	18	7	17	8	12	11	10	15	24	11.0
13	9	2	15	-5	4	-5	0	9	0	14	2	5	3	7	-5	-5	6	11	-5	-4	4	-5	11	-5	24	2.6
14	10	-5	5	-1	1	7	-1	4	2	4	-1	6	0	6	4	4	2	1	1	-1	-5	-5	9	23	24	2.9
15	-5	20	-5	14	0	5	2	14	0	13	11	11	16	6	10	14	7	-1	-1	8	4	1	6	31	24	7.5
16	-3	2	12	3	20	9	3	-1	4	15	19	7	8	3	9	2	0	2	6	4	8	4	5	5	24	6.1
17	16	-1	13	4	-3	18	8	3	18	7	17	6	4	5	8	8	-1	8	3	5	-5	11	22	17	24	8.0
18	-2	14	10	11	19	-4	19	-5	9	11	12	20	6	7	6	4	18	-2	6	8	7	8	10	21	24	8.9
19	-4	18	3	10	6	-3	22	-5	9	15	19	18	12	14	11	6	12	10	4	-5	2	9	21	21	24	9.4
20	8	5	12	7	18	5	5	3	13	15	20	10	14	9	10	19	2	-2	3	10	8	17	3	22	24	9.8
21	8	24	-3	5	1	18	11	7	18	28	BA	BA	32	25	16	17	25	5	10	12	5	14	3	10	22	13.2
22	5	11	-3	18	1	2	16	11	16	11	18	32	45	44	30	-1	12	18	-3	9	6	2	3	11	24	13.1
23	7	-5	9	2	9	8	10	2	10	10	6	11	16	8	14	13	8	0	4	-1	4	2	10	5	24	6.8
24	3	7	10	-2	9	-4	2	2	12	8	1	-3	10	0	19	20	14	-3	-3	-5	1	1	-2	12	24	4.5
25	3	4	9	5	5	6	5	-5	2	2	7	3	3	-3	-5	5	8	-1	4	-2	2	-5	4	11	24	2.8
26	25	-5	5	-5	8	10	7	-1	2	11	3	1	2	3	2	15	8	0	-1	23	19	8	10	19	24	7.0
27	9	4	9	12	7	7	14	11	11	20	15	10	1	13	6	13	-2	7	5	1	-5	15	-5	4	24	7.6
28	11	-5	0	7	-5	14	1	6	3	0	-2	-4	10	-5	11	5	2	-1	1	-5	0	6	1	1	24	2.2
29	-1	5	0	5	3	12	-5	8	-5	15	5	-1	2	-5	-2	3	-4	-1	3	0	3	-5	2	7	24	1.8
30	0	5	-5	6	6	12	-5	-1	0	12	3	-4	4	3	-5	BA	13	0	-2	2	-2	1	1	0	23	1.9
NO.	30	30	30	30	30	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	30	30	30		
MAX.	25	24	15	18	28	18	22	17	20	28	20	32	45	44	30	20	25	18	17	23	19	17	22	31		
AVG.	6	5	4	5	6	5	5	3	7	10	8	6	10	7	8	7	6	3	3	3	3	4	6	11		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Warm Springs Site May 2010 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	3	-5	20	1	-5	-5	16	-1	2	-1	7	15	-5	5	9	-5	11	8	-5	-4	-5	1	-4	7	24	2.5
2	2	-5	-5	6	-5	-5	10	5	-2	9	-5	8	-5	16	-2	4	-5	-1	1	-5	-3	-4	5	3	24	0.7
3	1	5	0	-1	2	1	-1	1	5	4	49	149	22	7	3	10	-2	1	-5	19	38	19	18	25	24	15.4
4	9	16	11	0	7	5	3	0	6	5	1	-3	4	3	1	4	2	-5	5	1	-2	0	5	2	24	3.3
5	0	-5	19	15	-5	12	-5	6	4	8	3	6	4	5	16	8	11	7	5	0	2	42	3	4	24	6.9
6	3	7	15	-5	18	21	2	2	14	12	21	11	7	-5	13	4	4	2	-3	-5	17	8	0	0	24	6.8
7	12	-1	4	-5	-2	2	22	-5	6	0	3	4	4	10	3	-5	14	-5	BA	27	4	2	-5	8	23	4.2
8	9	-5	-4	18	0	8	-5	9	3	10	6	4	1	3	10	-2	-3	12	4	-5	4	10	-3	6	24	3.8
9	4	18	-3	48	58	-4	16	0	8	-4	8	-3	-3	3	7	1	4	-5	0	-4	4	1	0	21	24	7.3
10	-5	6	14	-5	8	-5	-1	5	12	1	9	16	3	7	4	-5	7	7	3	6	-5	23	1	-5	24	4.2
11	7	4	9	-5	-2	2	10	5	24	24	15	6	30	22	21	25	32	4	4	5	-1	6	5	1	24	10.5
12	7	2	3	17	-5	-4	3	17	3	6	19	12	11	9	8	13	19	-1	-1	4	4	8	7	11	24	7.2
13	9	1	-5	4	5	-5	8	11	4	9	13	9	13	12	0	15	13	4	0	10	-2	-5	5	11	24	5.8
14	13	6	2	1	19	1	4	15	6	12	19	13	8	12	3	7	-3	3	22	21	5	6	6	12	24	8.9
15	1	14	9	8	8	13	9	11	11	14	22	-5	5	16	-5	6	2	-5	5	13	7	-2	13	12	24	7.6
16	9	13	6	-1	1	8	-5	12	13	11	9	9	4	2	1	0	4	6	2	-5	-2	-5	5	15	24	4.7
17	6	3	9	4	1	3	8	15	18	12	7	0	5	-5	5	12	-3	8	6	1	0	-3	9	9	24	5.4
18	7	12	3	9	10	4	12	8	7	9	4	9	-5	-5	28	5	27	3	-3	0	-3	3	7	5	24	6.5
19	-5	8	-5	8	-5	2	0	2	0	5	6	11	-2	3	2	-5	7	-5	-1	2	-5	-4	2	5	24	1.1
20	1	3	5	5	4	11	-3	-2	2	16	0	10	-5	1	2	-2	3	-5	13	-1	-5	-4	-3	2	24	2.0
21	-5	-3	10	-1	-3	8	-2	0	6	4	1	-5	10	8	0	10	-3	-2	11	-5	-5	11	3	1	24	2.0
22	-5	-3	8	2	2	-1	4	5	0	-5	10	-4	1	7	-5	6	-5	-5	4	3	-5	7	0	-1	24	0.8
23	-4	7	-5	2	5	AM	17	15	2	0	7	1	-2	9	6	-4	3	3	2	-5	-5	-3	5	15	23	3.1
24	3	-5	20	1	0	1	-1	2	-2	3	2	-1	13	-3	-5	13	-2	-4	0	-2	-5	3	-5	7	24	1.4
25	7	-5	7	5	-5	0	5	-5	2	2	9	1	2	9	-5	2	-4	-2	3	-5	4	-5	-5	0	24	0.7
26	-5	23	3	1	9	-5	8	14	6	11	14	BA	24	2	4	6	4	1	6	5	8	6	1	1	23	6.4
27	17	6	-5	2	8	10	9	13	4	-5	-1	9	11	-2	-5	10	-1	-5	11	7	0	-5	5	9	24	4.3
28	-5	9	-1	2	-5	7	-5	6	5	-5	0	-1	-5	-3	-5	6	-4	-3	-2	-1	7	0	-2	-2	24	-0.3
29	-1	-5	0	2	1	6	-2	-3	4	2	3	9	-4	0	0	2	6	-5	3	3	-5	-3	1	-5	24	0.4
30	9	-2	3	0	-5	4	-2	-3	3	2	12	4	7	3	5	-3	0	10	-5	0	-5	2	8	9	24	2.3
31	-5	7	4	5	-5	2	1	2	6	0	2	-5	-4	4	6	8	-5	7	6	-5	2	3	-5	-5	24	1.1
NO.	31	31	31	31	31	30	31	31	31	31	31	30	31	31	31	31	31	31	30	31	31	31	31	31		
MAX.	17	23	20	48	58	21	22	17	24	24	49	149	30	22	28	25	32	12	22	27	38	42	18	25		
AVG.	3	4	5	5	4	3	4	5	6	6	9	10	5	5	4	5	4	1	3	2	1	4	3	6		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Warm Springs Site June 2010 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-5	8	-4	2	14	-5	5	5	0	1	9	3	-5	16	5	-5	6	1	-5	7	1	-3	7	-5	24	2.2
2	5	1	0	3	1	-1	9	3	-1	16	2	3	BA	2	5	1	5	-5	3	0	-5	-2	2	-5	23	1.8
3	9	-5	2	-5	12	0	3	-2	3	0	1	-3	-2	12	4	-3	10	-5	-5	-4	1	4	-5	21	24	1.8
4	-5	5	4	-5	14	-5	19	-5	1	8	-2	9	0	1	-1	-2	-2	-5	11	-4	-5	-3	2	4	24	1.4
5	-5	-5	3	9	-5	12	-5	14	-5	0	5	3	2	9	2	10	5	2	-4	-5	-3	20	-5	25	24	3.3
6	-5	10	-5	17	3	6	3	7	7	16	9	-2	6	-5	13	-5	16	-5	0	5	-5	13	-2	2	24	4.1
7	-1	-4	-2	2	3	4	14	7	2	-2	14	5	-5	22	-5	5	-2	-5	-5	12	-5	2	9	0	24	2.7
8	5	-5	7	1	-3	-5	7	4	7	3	3	9	-5	5	8	-5	9	2	-1	-5	-5	1	9	12	24	2.4
9	11	-5	8	14	3	4	17	12	12	2	2	4	0	8	9	10	5	12	-5	-2	-5	10	4	8	24	5.8
10	2	-3	10	-3	8	0	4	5	6	-2	12	5	-4	-5	-3	19	-5	-1	6	-5	1	1	14	-5	24	2.4
11	2	-2	1	-5	1	10	-2	2	-2	10	-5	6	-3	-1	2	3	0	7	5	1	-1	10	10	17	24	2.8
12	-5	19	-2	10	8	5	23	-4	4	9	5	4	10	7	6	9	9	-5	-4	2	3	-4	4	27	24	5.8
13	-5	18	-4	5	7	2	20	1	15	2	9	4	7	4	37	3	3	3	-3	12	-5	-5	6	16	24	6.3
14	6	5	0	8	20	4	0	10	22	9	8	14	7	5	10	7	5	-5	26	9	10	-1	49	32	24	10.8
15	41	-5	14	4	2	-3	5	7	-5	20	3	4	-5	13	1	7	AN	4	9	0	4	6	-2	4	23	5.6
16	1	8	-5	6	3	2	-5	3	5	1	4	-3	-2	-3	0	18	6	-4	6	1	8	-3	2	-5	24	1.8
17	0	-5	3	-2	3	15	-5	1	-5	10	-2	7	1	0	0	4	0	-1	-2	1	9	-5	2	61	24	3.8
18	-5	29	8	-5	-5	6	1	-5	7	5	6	9	2	-1	-1	BA	26	5	3	0	-4	5	-5	9	23	3.9
19	2	24	-3	0	9	3	5	5	1	13	2	8	21	-5	16	12	6	2	5	-5	7	-5	4	5	24	5.5
20	29	-5	5	-2	19	-3	-3	13	1	7	11	4	18	-5	17	-5	1	22	-2	4	2	-5	13	-1	24	5.6
21	6	13	-5	0	-5	25	-5	7	-5	11	3	7	2	54	-5	6	-2	0	3	-5	8	-3	-5	13	24	4.9
22	26	8	-5	0	26	-3	-5	16	0	15	-5	14	2	8	2	11	-2	4	-5	15	3	2	-5	-5	24	4.9
23	29	6	0	9	7	-5	-3	19	5	17	14	1	4	8	7	-2	10	-2	-5	23	-1	3	3	6	24	6.4
24	-5	26	-5	12	10	6	14	3	6	11	5	17	8	14	4	11	-2	6	2	-5	3	0	33	9	24	7.6
25	14	-2	13	6	16	10	6	-1	5	12	9	-1	7	20	-5	8	-5	21	10	-2	2	17	-5	3	24	6.6
26	10	6	-5	5	8	21	-5	5	17	-2	8	10	8	3	4	8	-4	3	-2	4	-5	-5	-1	24	24	4.8
27	10	8	-5	17	-5	-4	20	4	4	15	3	4	4	8	3	10	7	3	-5	-1	3	-5	-1	9	24	4.4
28	10	4	5	-2	10	0	17	13	18	8	12	13	1	6	3	-1	-2	-5	3	3	-5	-2	2	25	24	5.7
29	14	0	17	8	19	5	10	8	24	-1	6	10	6	12	146	-5	-2	16	78	12	6	-5	58	26	24	19.5
30	-5	14	6	31	-5	-5	10	20	9	24	-5	32	25	17	18	-4	-5	8	7	9	3	4	-3	22	24	9.5
NO.	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	29	29	30	30	30	30	30	30	30		
MAX.	41	29	17	31	26	25	23	20	24	24	14	32	25	54	146	19	26	22	78	23	10	20	58	61		
AVG.	6	6	2	5	7	3	6	6	5	8	5	7	4	8	10	4	3	2	4	3	1	1	6	12		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Qualifier Codes and Descriptions

as of 12-APR-07

Qualifier Type	Qualifier Type Desc	Qualifier Code	Qualifier Desc
EX	Exceptional Event Qualifier	D	SANDBLASTING
		F	STRUCTURAL FIRE
		H	CHEMICAL SPILLS & INDUST. ACCIDENTS
		I	UNUSUAL TRAFFIC CONGESTION
		J	CONSTRUCTION/DEMOLITION
		K	AGRICULTURAL TILLING
		L	HIGHWAY CONSTRUCTION
		M	REROUTING OF TRAFFIC
		N	SANDING/SALTING OF STREETS
		O	INFREQUENT LARGE GATHERINGS
		P	ROOFING OPERATIONS
		Q	PRESCRIBED BURNING
		R	CLEAN UP AFTER A MAJOR DISASTER
NAT	Natural Event Qualifier	A	HIGH WINDS
		B	STRATOSPHERIC OZONE INTRUSION
		C	VOLCANIC ERUPTIONS
		E	FOREST FIRE
		G	HIGH POLLEN COUNT
		S	SEISMIC ACTIVITY
		U	SAHARA DUST
NULL	Null Data Qualifier	AA	SAMPLE PRESSURE OUT OF LIMITS
		AB	TECHNICIAN UNAVAILABLE
		AC	CONSTRUCTION/REPAIRS IN AREA
		AD	SHELTER STORM DAMAGE
		AE	SHELTER TEMPERATURE OUTSIDE LIMITS
		AF	SCHEDULED BUT NOT COLLECTED
		AG	SAMPLE TIME OUT OF LIMITS
		AH	SAMPLE FLOW RATE OUT OF LIMITS
		AI	INSUFFICIENT DATA (CANNOT CALCULATE)
		AJ	FILTER DAMAGE
		AK	FILTER LEAK
		AL	VOIDED BY OPERATOR
		AM	MISCELLANEOUS VOID
		AN	MACHINE MALFUNCTION
		AO	BAD WEATHER
		AP	VANDALISM
		AQ	COLLECTION ERROR
		AR	LAB ERROR
		AS	POOR QUALITY ASSURANCE RESULTS
		AT	CALIBRATION
		AU	MONITORING WAIVED
		AV	POWER FAILURE (POWR)
		AW	WILDLIFE DAMAGE
		AX	PRECISION CHECK (PREC)
		AY	Q C CONTROL POINTS (ZERO/SPAN)
		AZ	Q C AUDIT (AUDT)

		BA	MAINTENANCE/ROUTINE REPAIRS
		BB	UNABLE TO REACH SITE
		BC	MULTI-POINT CALIBRATION
		BD	AUTO CALIBRATION
		BE	BUILDING/SITE REPAIR
		BF	PRECISION/ZERO/SPAN
		BG	Missing ozone data not likely to exceed level of standard
		BH	Interference/co-elution
		BI	Lost or damaged in transit
		BJ	Operator Error
		BK	Site computer/data logger down
		SA	Storm Approaching
QA	Quality Assurance Qualifier	1	Deviation from a CFR/Critical Criteria Requirement
		2	Operational Deviation
		3	Field Issue
		4	Lab Issue
		5	Outlier
		6	QAPP Issue
		7	Below Lowest Calibration Level
		9	Negative value detected - zero reported
		MD	Value between MDL and IDL
		ND	No Value Detected
		SQ	Values Between SQL and MDL
		V	VALIDATED VALUE
		W	FLOW RATE AVERAGE OUT OF SPEC.
		X	FILTER TEMPERATURE DIFFERENCE OUT OF SPEC.
		Y	ELAPSED SAMPLE TIME OUT OF SPEC.

ATTACHMENT 1

LABORATORY ANALYTICAL REPORTS

Note: Non-applicable portions of laboratory reports have been excluded.

Friday, June 04, 2010

Analytical Laboratory

Steve Heck
Kuipers & Associates, LLC
P.O. Box 641
Butte, MT 59703

RE: DUSTFALL BUCKETS

Work Order: 1004136

Dear Steve Heck:

MSE Lab Services received 6 sample(s) on 4/27/2010 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Marcee Cameron

Marcee Cameron
Laboratory Director/ Chemist
406-494-7334

Enclosure

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

E-MAILED
6/6 MC

MSE Lab Services

Date: *04-Jun-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1004136
Project: DUSTFALL BUCKETS
Lab ID: 1004136-001

Client Sample ID: KA-SP-4-49389
Collection Date: 4/26/2010 3:44:00 PM
Matrix: FILTER

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	13.8	0.341	1.18		mg/Kg	1	5/13/2010
Cadmium	0.561	0.021	0.078		mg/Kg	1	5/13/2010
Copper	101	0.322	0.981		mg/Kg	1	5/13/2010
Lead	19.0	0.035	0.157		mg/Kg	1	5/13/2010
Zinc	121	0.717	2.35		mg/Kg	1	5/13/2010
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **bo/yf**
Sample/Filter Weight	0.0637	0.0001	0.0001		g	1	5/5/2010

Review

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE Lab Services

Date: *04-Jun-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1004136
Project: DUSTFALL BUCKETS
Lab ID: 1004136-002

Client Sample ID: KA-SP-4-49468
Collection Date: 4/26/2010 2:50:00 PM
Matrix: FILTER

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	20.9	0.172	0.592		mg/Kg	1	5/13/2010
Cadmium	1.09	0.010	0.039		mg/Kg	1	5/13/2010
Copper	114	0.162	0.493		mg/Kg	1	5/13/2010
Lead	49.2	0.018	0.079		mg/Kg	1	5/13/2010
Zinc	221	0.361	1.18		mg/Kg	1	5/13/2010
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **bo/yf**
Sample/Filter Weight	0.1267	0.0001	0.0001		g	1	5/5/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *04-Jun-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1004136
Project: DUSTFALL BUCKETS
Lab ID: 1004136-003

Client Sample ID: KA-DF-10-005
Collection Date: 4/26/2010 2:50:00 PM
Matrix: AQUEOUS

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	1.79	0.041	0.140		µg/L	1	5/13/2010
Cadmium	0.061	0.002	0.009		µg/L	1	5/13/2010
Copper	7.62	0.038	0.117		µg/L	1	5/13/2010
Lead	2.11	0.004	0.019		µg/L	1	5/13/2010
Zinc	17.4	0.086	0.281		µg/L	1	5/13/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	28	5	10		mg/L	1	4/30/2010

Review

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *04-Jun-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1004136
Project: DUSTFALL BUCKETS
Lab ID: 1004136-004

Client Sample ID: KA-DF-10-006
Collection Date: 4/26/2010 3:44:00 PM
Matrix: AQUEOUS

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	4.54	0.084	0.288		µg/L	1	5/13/2010
Cadmium	0.430	0.005	0.019		µg/L	1	5/13/2010
Copper	23.7	0.079	0.240		µg/L	1	5/13/2010
Lead	4.63	0.009	0.038		µg/L	1	5/13/2010
Zinc	73.2	0.176	0.577		µg/L	1	5/13/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	69	5	10		mg/L	1	4/30/2010

Review

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *04-Jun-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1004136
Project: DUSTFALL BUCKETS
Lab ID: 1004136-005

Client Sample ID: KA-DF-10-007
Collection Date: 4/26/2010 3:44:00 PM
Matrix: AQUEOUS

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	1.02	0.029	0.098		µg/L	1	5/13/2010
Cadmium	0.033	0.002	0.007		µg/L	1	5/13/2010
Copper	6.13	0.027	0.082		µg/L	1	5/13/2010
Lead	2.12	0.003	0.013		µg/L	1	5/13/2010
Zinc	10.6	0.060	0.197		µg/L	1	5/13/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	12	5	10		mg/L	1	4/30/2010

Review

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *04-Jun-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1004136
Project: DUSTFALL BUCKETS
Lab ID: 1004136-006

Client Sample ID: WT CHM TDS BLANK
Collection Date:
Matrix:

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	ND	0.217	0.750		µg/L	1	5/13/2010
Cadmium	ND	0.013	0.050		µg/L	1	5/13/2010
Copper	0.531	0.205	0.625	J	µg/L	1	5/13/2010
Lead	0.065	0.023	0.100	J	µg/L	1	5/13/2010
Zinc	1.23	0.457	1.50	J	µg/L	1	5/13/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	ND	5	10		mg/L	1	4/30/2010

Review

Qualifiers:					
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 04-Jun-10
Report Date: 04-Jun-10

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 1004136
BatchID: 3245

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***3245-PB-UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***3245***			*Analysis Date:*	***5/13/2010***	
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	0.183	0.300	mg/Kg							J
Sample ID: ***3245-PB-FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***3245***			*Analysis Date:*	***5/13/2010***	
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	2.05	0.300	mg/Kg							
Sample ID: ***3245-LCS***			*Method:* ***SW6020***		*Batch ID:* ***3245***			*Analysis Date:*	***5/13/2010***	
Arsenic	66.6	0.149	mg/Kg	70.05	95.1	80	120			
Cadmium	206	0.010	mg/Kg	213.3	96.8	80	120			
Copper	171	0.124	mg/Kg	176.6	96.5	80	120			
Lead	79.6	0.020	mg/Kg	84.24	94.4	80	120			
Zinc	627	0.298	mg/Kg	650.9	96.3	80	120			
Sample ID: ***1004136-001AMS***			*Method:* ***SW6020***		*Batch ID:* ***3245***			*Analysis Date:*	***5/13/2010***	
Arsenic	29.1	1.18	mg/Kg	15.70	97.8	75	125			
Cadmium	19.7	0.078	mg/Kg	19.62	97.6	75	125			
Copper	200	0.981	mg/Kg	98.12	101	75	125			
Lead	26.2	0.157	mg/Kg	7.849	91.9	75	125			
Zinc	312	2.35	mg/Kg	196.2	97.4	75	125			
Sample ID: ***1004136-001AMSD***			*Method:* ***SW6020***		*Batch ID:* ***3245***			*Analysis Date:*	***5/13/2010***	
Arsenic	28.8	1.18	mg/Kg	15.70	95.6	75	125	1.19	20	
Cadmium	19.1	0.078	mg/Kg	19.62	94.3	75	125	3.38	20	
Copper	196	0.981	mg/Kg	98.12	96.8	75	125	1.85	20	
Lead	26.1	0.157	mg/Kg	7.849	90.8	75	125	0.324	20	
Zinc	307	2.35	mg/Kg	196.2	94.9	75	125	1.58	20	

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

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Date: 04-Jun-10
Report Date: 04-Jun-10

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 1004136
BatchID: 3248

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***3248-PB***			*Method:* ***SW6020A***		*Batch ID:* ***3248***				*Analysis Date:* ***5/13/2010***	
Arsenic	ND	1.50	µg/L							
Cadmium	ND	0.250	µg/L							
Copper	0.366	1.25	µg/L							J
Lead	0.305	0.250	µg/L							
Zinc	28.2	5.00	µg/L							
Sample ID: ***3248-DI BLANK***			*Method:* ***SW6020A***		*Batch ID:* ***3248***				*Analysis Date:* ***5/13/2010***	
Arsenic	ND	1.50	µg/L							
Cadmium	ND	0.250	µg/L							
Copper	ND	1.25	µg/L							
Lead	ND	0.250	µg/L							
Zinc	1.68	5.00	µg/L							J
Sample ID: ***3248-LCS***			*Method:* ***SW6020A***		*Batch ID:* ***3248***				*Analysis Date:* ***5/13/2010***	
Arsenic	20.1	1.50	µg/L	20.00	100	80	120			
Cadmium	2.00	0.250	µg/L	2.000	99.9	80	120			
Copper	22.2	1.25	µg/L	20.00	111	80	120			
Lead	21.5	0.250	µg/L	20.00	107	80	120			
Zinc	408	5.00	µg/L	400.0	102	80	120			
Sample ID: ***1004136-003AMS***			*Method:* ***SW6020A***		*Batch ID:* ***3248***				*Analysis Date:* ***5/13/2010***	
Arsenic	3.58	0.140	µg/L	1.872	96.0	70	130			
Cadmium	2.32	0.023	µg/L	2.340	96.3	70	130			
Copper	19.1	0.117	µg/L	11.70	98.5	70	130			
Lead	2.95	0.023	µg/L	0.9360	90.0	70	130			
Zinc	40.4	0.468	µg/L	23.40	98.4	70	130			
Sample ID: ***1004136-003AMSD***			*Method:* ***SW6020A***		*Batch ID:* ***3248***				*Analysis Date:* ***5/13/2010***	
Arsenic	3.56	0.140	µg/L	1.872	94.9	70	130	0.577	20	
Cadmium	2.34	0.023	µg/L	2.340	97.3	70	130	0.981	20	
Copper	19.1	0.117	µg/L	11.70	98.3	70	130	0.102	20	
Lead	2.95	0.023	µg/L	0.9360	89.4	70	130	0.197	20	
Zinc	40.6	0.468	µg/L	23.40	99.0	70	130	0.363	20	

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

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Date: 04-Jun-10
Report Date: 04-Jun-10

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 1004136
BatchID: R12585

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***PB (1004136-006A)***			*Method:* ***A2540C***		*Batch ID:* ***R12585***				*Analysis Date:* ***4/30/2010***	
TDS	ND	10	mg/L							
Sample ID: ***LCS***			*Method:* ***A2540C***		*Batch ID:* ***R12585***				*Analysis Date:* ***4/30/2010***	
TDS	766	10	mg/L	757.5	101	80	120			

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

FORM MSE-169
(Rev. 09/08)

MSE Technology Applications, Inc.
Laboratory Services

CHAIN OF CUSTODY

MSE WORK ORDER # 1004136

BILL TO KUIPERS + ASSOCIATES

Company Name: Blacktail Consulting	Project Manager: Steve Heck
Address: POB 4692	Project Name and Number:
City: Butte State: MT Zip: 59702	Email Address: sheck@rfwave.net
Phone: 498-4199	Purchase Order #:
Fax: ———	Sampler Name and Phone #: S. Heck 498-4199

SAMPLE ID	LAB ID	DATE	TIME	TOTAL PARTICULATE	As, Cd, Cu, Pb, Zn
KA-SP-4-49389	1004136-001A	4-26-10	1544	X	X
KA-SP-4-49468	002A	4-26-10	1450	X	X
KA-DF-10-005	003A	4-26-10	1450	X	X
KA-DF-10-006	004A	4-26-10	1544	X	X
KA-DF-10-007	005A	4-26-10	1544	X	X

ANALYSIS REQUESTED

REMARKS

Please contact Steve Heck at 498-4199 when ready to weigh cassettes.

Turnaround Time (TAT) / Reporting

- X Standard
- ___ Next Day*
- ___ 2nd Day*
- ___ Other*

*All rush order requests must have prior approval

- ___ Phone
- ___ Mail
- ___ Fax
- X Email

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
Steven R Heck	4-27-10	1235	Sara Ward	4/27/10	1235
PRINTED NAME: Steven R Heck	COMPANY: Blacktail Cons.		PRINTED NAME: Sara Ward	COMPANY: MSE-TA	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	N
Containers Sealed?	(Y)	N
Cooler Sealed?	Y	(N)

Delivery Method: h/d in box
Temperature (°C): 16.5°C
Preservative: ———
Date & Time: ———
Inspected By: ———

MSE LABORATORY SERVICES
200 Technology Way, P.O. Box 4078
Butte, MT 59701
PH: (406) 494-7334 / FAX: (406) 494-7128
labinfo@mse-ta.com

MSE Lab Services

Sample Receipt Checklist

Client Name KUIPERS&ASSOC

Date and Time Received: 4/27/2010 12:35:00 PM

Work Order Number 1004136 RcptNo: 1

Received by SW

COC_ID: CoolerID:

Checklist completed by Debbie Ortega 4-28-10 Reviewed by SW 4/29/10

Signature Date Initials Date

Matrix: Carrier name Hand-Delivered

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☑	No ☐	Not Present ☐
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Blank ☐

Adjusted? NO Checked by BD/YF 4-29-10

Any No and/or NA (not applicable) response must be detailed in the comments section be

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: REC'D IN BOX. TEMP=16.50oC

Corrective Action _____